TAPR TACGPS Development and Support Mailing List Archive, July 1997 through December 1998

July 1997 through December 1998

the development and support forum for TAPR's TAC-2 GPS precision-timing project, covering Motorola Oncore receivers, timing and frequency standards, NMEA data, firmware and software, circuit boards, assembly, testing, antennas, Unix tools, calibration, and scientific timing applications.

This volume contains 18 original monthly files and 1,428 messages, arranged chronologically. The PDF is a readable access copy: MIME transfer encodings are decoded, HTML bodies are converted to plain text, and non-text attachments are represented by descriptive notes. The raw source text is supplied separately with the Internet Archive item.

Month	Messages	Original source file
1997-07	19	tacgps.9707
1997-08	34	tacgps.9708
1997-09	129	tacgps.9709
1997-10	114	tacgps.9710
1997-11	61	tacgps.9711
1997-12	93	tacgps.9712
1998-01	36	tacgps.9801
1998-02	52	tacgps.9802
1998-03	143	tacgps.9803
1998-04	201	tacgps.9804
1998-05	140	tacgps.9805
1998-06	132	tacgps.9806
1998-07	50	tacgps.9807
1998-08	65	tacgps.9808
1998-09	33	tacgps.9809
1998-10	55	tacgps.9810
1998-11	17	tacgps.9811
1998-12	54	tacgps.9812

July 1997

Original source file: tacgps.9707
Source: http://ftp.tapr.org/product_docs/TAC2/mail_archives/tacgps.9707

1. [TACGPS:511] Re: Please resend

From: Lyle Johnson <lylej@azstarnet.com>
Date: Tue, 1 Jul 1997 22:44:35 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.32.19970701202015.00c4b6c4@pop.azstarnet.com>
Rendered body type: text/plain

>The last tacgps item I saw was from Lyle who suggested that SHOWTIME be
>JAVA'd [a question -- can JAVA applications actually talk to hardware
>RS232 ports? Especially to be able to read the DCD line? -- I'd be
surprised!]

Here are the words I got from our JAVA expert:

***

Java has standard run-time OS calls for opening files, devices,
etc. I heard about a serial port class that's available for
accessing modem control lines, timeout parameters, etc.

The reason that most people think that Java is just for applets
is that applets run with such tight security constraints. When
run as an applet, Java is prevented from accessing any local
resources on the client. When run locally, however, Java has
the same access to local that any other program has.

Even if you have something for which Java just doesn't have built-in
support, it's easy to write a native class in C or C++ that accesses
the required resources. Such classes wind up being a tiny part of
the code, and this becomes the only portion of your application that
requires porting.

***

Cheers,

Lyle

2. [TACGPS:512] Travelling

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Fri, 4 Jul 1997 21:14:58 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <33BDAD45.5F96@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Just a reminder -- I leave in a few hours for 2+ weeks in China.
During that time, it is quite likely I'll be out of touch since
their Internet connections are pretty marginal. I get back in
town late the nite of 22 July.

FYI -- I'll be in 2 locations. The first week is at the Seshan
telescope of the Shanghai Astronomical Observatory (abut 30 km
west of Shanghai). The 2nd week is at the Urumqi Astronomical
Observatory -- Urumqi is in the far west of China, west of
Mongolia, north of Tibet and not far from the Kazakstan border
(on the old Marco Polo Silk Road). Near the telescope is a marker
that this point is the "land pole" of the world, further from any
ocean than anywhere else on earth. For the TACers, both stations use
my TACs and I have one of my 8-channel TAC-2 prototypes with me.
The purpose of our visit is to fix a number of problems at the VLBI
stations including their time/frequency hardware.

73, Tom

3. [TACGPS:513] ocnore.sit

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Sat, 5 Jul 1997 03:17:42 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <v0302094cafe3b2a7855e@[208.134.134.40]>
Rendered body type: text/plain

I just dropped oncore.sit into the TACDEV ftp area.

These are suppose to be the testing programs for getting the ONCORE VP
online. Can someone test them out with their unit and let me know they
work okay.

Greg

Greg Jones, WD5IVD
Austin, Texas
wd5ivd@tapr.org
http://www.tapr.org/~wd5ivd
-----

4. [TACGPS:517] Re: ocnore.sit

From: clark@tomcat.gsfc.nasa.gov
Date: Sun, 6 Jul 1997 21:52:09 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <32219@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

All the ONCORE software is on aleph -- go to the ~/distrinbution
directory and follow the readme file instructions. When you get done,
you will have a file motorola.zip which has the latest motorola controller
software.

FYI -- I'm in Shanghai now

73, Tom

5. [TACGPS:518] TAC2 setup under Unix

From: dougm@netcom.com (D. Douglas Muirhead)
Date: Tue, 8 Jul 1997 04:03:26 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199707080900.CAA08734@netcom13.netcom.com>
Rendered body type: text/plain

I want to use the TAC2 and a Motorola receiver
under Sun Solaris and Linux. I cannot use SHOWTIME
to set up the receiver. The NTP distribution does
not have a driver for Motorola Oncore receivers.

Will I have to figure out on my own which commands
to issue to set up the receiver, or is there some
reference code available for Unix systems?

Thanks,
        Doug Muirhead

6. [TACGPS:518] TAC2 setup under Unix

From: dougm@netcom.com (D. Douglas Muirhead)
Date: Tue, 8 Jul 1997 04:03:26 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199707080900.CAA08734@netcom13.netcom.com>
Rendered body type: text/plain

I want to use the TAC2 and a Motorola receiver
under Sun Solaris and Linux. I cannot use SHOWTIME
to set up the receiver. The NTP distribution does
not have a driver for Motorola Oncore receivers.

Will I have to figure out on my own which commands
to issue to set up the receiver, or is there some
reference code available for Unix systems?

Thanks,
        Doug Muirhead

7. [TACGPS:519] Re: TAC2 setup under Unix

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Tue, 8 Jul 1997 14:17:00 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <v03020934afe83e8231ed@[208.134.134.40]>
Rendered body type: text/plain

Hi Doug.

Sorry, but the TACGPS list is a closed list for the development team. The
list monitor Paul Beckman must not have caught when you signed up.

Anyway, I'll make sure one of the TAC-2 groups answers your questions.

We will have a open support list for the TAC-2 working in the next few days
called 'GPS'. Keep an eye on the listserv. This will be the list to post
questions of this type.

Cheers - Greg, WD5IVD

>From: dougm@netcom.com
>
>I want to use the TAC2 and a Motorola receiver
>under Sun Solaris and Linux. I cannot use SHOWTIME
>to set up the receiver. The NTP distribution does
>not have a driver for Motorola Oncore receivers.
>
>Will I have to figure out on my own which commands
>to issue to set up the receiver, or is there some
>reference code available for Unix systems?
>
>Thanks,
>   Doug Muirhead

Greg Jones, WD5IVD
Austin, Texas
wd5ivd@tapr.org
http://www.tapr.org/~wd5ivd
-----

8. [TACGPS:519] Re: TAC2 setup under Unix

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Tue, 8 Jul 1997 14:17:00 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <v03020934afe83e8231ed@[208.134.134.40]>
Rendered body type: text/plain

Hi Doug.

Sorry, but the TACGPS list is a closed list for the development team. The
list monitor Paul Beckman must not have caught when you signed up.

Anyway, I'll make sure one of the TAC-2 groups answers your questions.

We will have a open support list for the TAC-2 working in the next few days
called 'GPS'. Keep an eye on the listserv. This will be the list to post
questions of this type.

Cheers - Greg, WD5IVD

>From: dougm@netcom.com
>
>I want to use the TAC2 and a Motorola receiver
>under Sun Solaris and Linux. I cannot use SHOWTIME
>to set up the receiver. The NTP distribution does
>not have a driver for Motorola Oncore receivers.
>
>Will I have to figure out on my own which commands
>to issue to set up the receiver, or is there some
>reference code available for Unix systems?
>
>Thanks,
>   Doug Muirhead

Greg Jones, WD5IVD
Austin, Texas
wd5ivd@tapr.org
http://www.tapr.org/~wd5ivd
-----

9. [TACGPS:520] Re: TAC2 setup under Unix

From: clark@tomcat.gsfc.nasa.gov
Date: Thu, 10 Jul 1997 06:25:24 -0500 (CDT)

To: tacgps@tapr.org
Message-ID: <32440@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

trying to answer from china -- there is NTP work on the ONCOREin progress.
The NTP daemon has some serious mic//// problems -- like not reading the
proper NMEA message for timing purposes! Will comment later -- Tom

10. [TACGPS:521] Installing MCX connector

From: John Ackermann AG9V <jra@febo.com>
Date: Wed, 16 Jul 1997 12:54:15 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199707161808.OAA02481@meow.febo.com>
Rendered body type: text/plain

Does anyone have instructions for installing an MCX connector onto RG-174
cable (or whatever is on the Trimble antenna)? I figured out the general
process, but the one I tried to install appears not to have enough of the
center pin extended to contact with the receiver. The dimensions for trimming
the cable would be very helpful...

Thanks,

John AG9V
jra@febo.com

11. [TACGPS:522] Re: Installing MCX connector

From: "Doug McKinney" <buoy@mcktech.com>
Date: Wed, 16 Jul 1997 23:17:13 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199707170414.VAA31595@mail.redshift.com>
Rendered body type: text/plain

> From: John Ackermann AG9V <jra@febo.com>
> To: tacgps@tapr.org
> Subject: [TACGPS:521] Installing MCX connector
> Date: Wednesday, July 16, 1997 10:54 AM
>
> Does anyone have instructions for installing an MCX connector onto RG-174
> cable (or whatever is on the Trimble antenna)? I figured out the general

> process, but the one I tried to install appears not to have enough of the

> center pin extended to contact with the receiver. The dimensions for
trimming
> the cable would be very helpful...
>
> Thanks,
>
> John AG9V
> jra@febo.com
>
John, I use the crimp-on, right angle, MCX, which has the center braid
soldered to the center pin. Use of other types were to hard. I cut the
outer covering to the same length as from the center pin back to the end of
the connector. I cut the shield back to match the crimp on sleeve. The
inner dielectric is cut to the radius of the opening. Next, lightly solder
the coax center conductor, then insert into connector to see how it fits in
the center pin notch and if necessary, reshape the coax wire to fit the
center pin. Now you need a needle point soldering iron to heat the center
pin and coax wire, Make sure the solder does not leave a tip sicking up,
because you will not be able to put the spacer and cap on the MCX. The
next part is the hardest, securing the cap. I secure the cap by soldering
it in place. For this procedure, heat the connector around the cap and get
lots of solder following and the carefully sweep the iron and solder over
the cap (the cap can start moving around, so do it fast, if you take too
long the dielectric for the center conductor will melt!!). Cool the
connector by blowing on it and slide the sleeve on and crimp. TA DA your
done. Yes it took a few tries to really get it right! Good Luck, Doug

12. [TACGPS:524] Issues re: TAC-2 assembly.

From: mdf@angoss.com (Matthew Francey)
Date: Mon, 28 Jul 1997 14:27:10 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199707281922.TAA22238@hydrogen>
Rendered body type: text/plain

I got my TAC-2 working on the weekend. Hundreds of dollars to just
see an LED blink every second ... :-)

Some questions/comments:

1. Currently, I'm burning 12V down to 5 and this makes things warmer than
   I prefer. The assembly manual mentions 3 possible "high efficiency"
   switching power supplies. Can I just select one at random? Two are the
   same, except for a "heat tab" -- does one need the "heat tab"?

2. There are a number of glitches in the assembly manual, though none of
   them are even close to fatal -- incorrect lead-counts in 3-4 places,
   and for ONCORE VP installation, one has to set a jumper to "I", not to "N"
   as the manual claims.

3. Is there a Linux or similar version of SHOWTIME?

4. [This isn't really a TAC issue, but hey] Playing around with the ONCORE's
   command set, I was looking at the "broadcast data". The GPS signal
   specification says that "sub-frame 4, page 17" is a "special message"
   which can be set at the "discretion of the system operator". It is
   22 characters, ASCII encoded.

   Earlier today, it seems that the "discretion" was:

               45HF16-UAEVT492W+14RR0

   If this isn't some US military secret, can someone tell me what this
   might mean?

Thanks!

13. [TACGPS:525] Re: Issues re: TAC-2 assembly.

From: "Steven R. Bible" <srbible@gate.net>
Date: Mon, 28 Jul 1997 18:40:30 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19970728193049.007d0780@pop.gate.net>
Rendered body type: text/plain

I'll try and answer some of your questions Matthew...

At 02:27 PM 7/28/97 -0500, you wrote:
>I got my TAC-2 working on the weekend. Hundreds of dollars to just
>see an LED blink every second ... :-)

You're a true pioneer now :-).

>Some questions/comments:
>
>1. Currently, I'm burning 12V down to 5 and this makes things warmer than
>   I prefer. The assembly manual mentions 3 possible "high efficiency"
>   switching power supplies. Can I just select one at random? Two are the
>   same, except for a "heat tab" -- does one need the "heat tab"?

I use a 9 VDC power supply. Check the Radio Shack catalog.

>2. There are a number of glitches in the assembly manual, though none of
>   them are even close to fatal -- incorrect lead-counts in 3-4 places,
>   and for ONCORE VP installation, one has to set a jumper to "I", not to "N"
>   as the manual claims.

We'll put these in the next rev of the assy man.

>3. Is there a Linux or similar version of SHOWTIME?

Not yet (any way). We hoped that by getting the TAC-2 out it would spur
other software development.

>4. [This isn't really a TAC issue, but hey] Playing around with the ONCORE's
>   command set, I was looking at the "broadcast data". The GPS signal
>   specification says that "sub-frame 4, page 17" is a "special message"
>   which can be set at the "discretion of the system operator". It is
>   22 characters, ASCII encoded.
>
>   Earlier today, it seems that the "discretion" was:
>
>   45HF16-UAEVT492W+14RR0
>
>   If this isn't some US military secret, can someone tell me what this

>   might mean?

I can't help you here.

 - Steve, N7HPR
 (n7hpr@tapr.org)

14. [TACGPS:526] List Status

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Mon, 28 Jul 1997 19:58:23 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <v0302090cb002efbda0d3@[208.134.134.40]>
Rendered body type: text/plain

L:ee has yet to get the GPS list up that we planned on doing support and
answer questions on. Do we want to open up the TACGPS list (which is open
now) for everyone and then when the TOC is ready to start, we can move over
to a development list ?

Greg

Greg Jones, WD5IVD
Austin, Texas
wd5ivd@tapr.org
http://www.tapr.org/~wd5ivd

    "Before you become too entranced with gorgeous gadgets
     and mesmerizing video displays, let me remind you that
     information is not knowledge, knowledge is not wisdom,
     and wisdom is not foresight. Each grows out of the other
     and we need them all."   -Arthur C. Clarke

15. [TACGPS:527] Re: List Status

From: Lyle Johnson <lylej@azstarnet.com>
Date: Mon, 28 Jul 1997 22:35:23 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.32.19970728194659.00d86e60@pop.azstarnet.com>
Rendered body type: text/plain

At 07:58 PM 7/28/97 -0500, you wrote:
>L:ee has yet to get the GPS list up that we planned on doing support and
>answer questions on. Do we want to open up the TACGPS list (which is open
>now) for everyone and then when the TOC is ready to start, we can move over
>to a development list ?
>
>Greg
>
>-----
>Greg Jones, WD5IVD
>Austin, Texas
>wd5ivd@tapr.org
>http://www.tapr.org/~wd5ivd
>-----
>
>   "Before you become too entranced with gorgeous gadgets
>   and mesmerizing video displays, let me remind you that
>   information is not knowledge, knowledge is not wisdom,
>   and wisdom is not foresight. Each grows out of the other
>   and we need them all."   -Arthur C. Clarke
>
>

OK by me.

Incidentally, speaking of TOC, I have two samples of a 10 MHZ VCXO coming
from MOnitor Products sometime in the next few weeks. Might not be ideal,
50 ppm correction sensitivity and they can't tell me the tens-of-minutes
stability of the ocsilaltor. COst would be in the mid $30s in 100s.

Cheers,

Lyle

16. [TACGPS:529] Re: List Status

From: Lyle Johnson <lylej@azstarnet.com>
Date: Mon, 28 Jul 1997 23:14:00 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.32.19970728210812.0076878c@pop.azstarnet.com>
Rendered body type: text/plain

At 10:54 PM 7/28/97 -0500, you wrote:
>What the cost in less than 100 ?
>
>Greg

$37 at qty 25. Smaller qty not quoted to me.

17. [TACGPS:531] Re: Issues re: TAC-2 assembly.

From: Lyndon Nerenberg <lyndon@ve7tcp.ampr.org>
Date: Tue, 29 Jul 1997 13:04:12 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199707291758.LAA13288@ve7tcp.ampr.org>
Rendered body type: text/plain

>>>>> "Steven" == Steven R Bible <srbible@gate.net> writes:

    >> 3. Is there a Linux or similar version of SHOWTIME?

    Steven> Not yet (any way). We hoped that by getting the TAC-2 out
    Steven> it would spur other software development.

I'm still waiting for my TAC kit to arrive, so this is a little ways
away, but I'm planning to use it to set up a stratum 1 NTP server on
ve7tcp.ampr.org. Assuming I can get the Oncore RS232 datalink wired
to the server I'll be writing a monitoring utility that will collect
info from the receiver, and allow for control of the receiver. I'll
make the source available once it's stable. It will be written for
4.4BSD, but should port easily to Linux.

--lyndon

18. [TACGPS:532] Regarding TAC Software

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Tue, 29 Jul 1997 14:20:46 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <33DE419C.C5CB5DE@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Lyndon Nerenberg wrote:
>
> >>>>> "Steven" == Steven R Bible <srbible@gate.net> writes:
>
>   >> 3. Is there a Linux or similar version of SHOWTIME?
>
>   Steven> Not yet (any way). We hoped that by getting the TAC-2 out
>   Steven> it would spur other software development.
>
> I'm still waiting for my TAC kit to arrive, so this is a little ways
> away, but I'm planning to use it to set up a stratum 1 NTP server on
> ve7tcp.ampr.org. Assuming I can get the Oncore RS232 datalink wired
> to the server I'll be writing a monitoring utility that will collect
> info from the receiver, and allow for control of the receiver. I'll
> make the source available once it's stable. It will be written for
> 4.4BSD, but should port easily to Linux.
>
> --lyndon

Sorry I have been out of touch for the past 3 weeks. I was on a business
trip
to two VLBI stations in China (one near Shanghai, the other in the far
west of
China near Urumqi) and was pretty much out of touch. FYI -- they are
using my
original TACs at these (and several other) Chinese stations and I can
report
that GPS in the opposite hemisphere looks pretty much like it does here!
Also,
I can report that the new Garmin GPS II+ works fine at airplane speeds.
I can
also lay claim to doing the first GPS survey of the location of a Kazakh
yurt
whilst riding on a Kazakh horse!

Now on the TAC software, I see that the formerly private TACGPS mailer has now
been opened up and many questions are flowing in. Be advised that much of the
early TAC and GPS timing discussion took place via another mailing list,
gps-timing@aleph.gsfc.nasa.gov. For people asking questions, you might want to
refer to the gps-timing archives. Set a news browser to point to to my aleph
server:
          news://aleph.gsfc.nasa.gov
and then "subscribe" to the gps-timing entry. This has all the archives available
for your perusal. In these archives, you will see a lot of postings by me about
the evolution of my MessDOS SHOWTIME code. You will also see a week-long burst of
activity on the NTP issues including inputs from Dave Mills ("Dr.NTP", a.k.a. W3HCF)
and Louie Makamos (WA3YMH).

Regarding NTP support -- here at NASA Goddard, my project has a real need for
working code. We support the VLBI (Very Long Baseline Interferometry) data
acquisition systems (1 Gb/s data recorders that record wideband noise from Quasars
using Hydrogen Maser frequency standards to achieve coherence times of a few
thousand seconds at X-band = 10e10 Hz) in use at a number of observatories around
the world (including the Chinese facilities where I was the past few weeks).

The instrument controller for the telescopes and the VLBI data systems (a.k.a. "FS" =
"Field System")is written in LINUX and runs on generic Pentiums. My FS code guru is Ed
Himwich (a.k.a. N3HXQ) who is working on the task of supporting the TAC in the LINUX
FS software, which should include NTP.

Ed has reported to me that there are problems with the generic NTP code in the
earlier LINUX kernals. I know of one (IMHO) serious "glitch" in all the NTP GPS
implementations when you are using the ONCORE in the "zero-D" mode I recommend for
achieving the highest possible timing accuracy (at levels of tens of nsec). The
existing generic NTP GPS code gets the current time from the $GPGGA NMEA message,
but $GPGGA is defined as the time >>OF THE LAST VALID POSITION FIX<<. In the zero-D
timing mode, the receiver does not do position fixes, but instead uses all the
GPS satellite pseudoranges to extract timing info under the assumption that the
position is known perfectly; this is incredibly effective for reducing the timing
"dither" of Selective Availability (SA) and errors in the broadcast GPS ephemerides.
But the time that is reported in the $GPGGA message can be days, weeks or months
ago, and does not change since the receiver is not doing position fixes (the same
comments apply to the timing info in the $GPRMC NMEA message).

The proper NMEA message to use (if the receiver supports it, and the ONCORE BASIC/VP do)
is $GPZDA, which reports the CURRENT GMT (i.e. UTC) time in any mode (and the ZDA
message also reports the date, which is missing from the GGA message). Therefore,
anyone planning to do some NTP code hacking needs to rewrite xntpd to properly recognize
& use the $GPZDA message.

If you plan to do some xntpd hacking, let me also note that the $GPZDA

message lags the
UTC second by ~0.6 seconds and you should not rely on the arrival of the message for
any precise timing functions. For reasons known only to them, Motorola elected to send
the $GPxxx messages in alphabetical order, so xxx=ZDA comes last. Before the ZDA
message several earlier messages are of variable length. Of particular concern is the
$GPGSV satellites-in-view message, which reports on the S/N, az, el for up to 12
satellites in NMEA sentences that contain only 4 satellites of info; therefore you
have to plan on a variable number of GSV messages preceeding the ZDA message! c'est
la vie!

In SHOWTIME, I read the time from the ZDA message knowing it is late. I increment the
time just read by one second and then apply the time when the hardware-generated 1PPS
pulse arrives on the RS232's DCD pin; the incrementing algorithm includes a carry so
that minutes & hours roll-over properly. In MessDOS, this works to within the resolution
of the DOS clock = 1/18 sec = 55 msec. The only time when this gives a hickup is at
the time of a leapsecond when the ZDA message reports seconds counts of :58, :59, :60
and then :00. SHOWTIME ends up displaying two successive :00 second readings.

Regarding SHOWTIME: As you doubtless know by now, SHOWTIME is an MessDOS "hack" that I
wrote in compiled QuickBasic 4.5. Many of the problems people report concern the fact
that QB's serial port support is verey minimal, and can lead to bizzare behavior when
running in a DOS box under Windows. I put aside any work on SHOWTIME a number of months
ago to try to get the TAC-2 hardware "out the door". SHOWTIME 3.34 sorta works, but
is not as reliable as I'd like to see. Rick Hambly (WB2TNL) has been woring on an
improved Windoze-friendly version, but the pressures of getting the TAC-2 hardware
ready and a lot of business travel have precluded us spending any time together to
make progress. I have not release the SHOWTIME code to the public because it needs
some grammatical cleanup (it has a helluva lot of lines REMmed out from earlier
abortive tests!) and because I don't want to waste time trying to explain its
philosophy and the myriad "tricks" I had to play to make it work well in an
obsolete language running in obsolete DOS!

Finally -- I think all the newcomers know, but my "official" TAC repository is my
aleph ftp file server:
    ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/
where you will find plots showing results, text info, software, etc.

73 de Tom, W3IWI

19. [TACGPS:533] Re: Regarding TAC Software

From: Lyndon Nerenberg <lyndon@ve7tcp.ampr.org>
Date: Wed, 30 Jul 1997 10:59:52 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199707301554.JAA05662@ve7tcp.ampr.org>
Rendered body type: text/plain

Thanks for the update, Tom.

What I had in mind for the local NTP clock was to write a GPS
controller program that would handle all the RS232 communications
with the Oncore and place the gleaned information into a shared
memory segment. Other apps (NTP, CGI web monitor tool) would look

into the SHM segment for clock info. xntpd would use the 1PPS on
the CD pin for its ticks, and would poke into the SHM segment for
the absolute time. As long as the SHM segment and the 1PPS are within
one second of each other (and one is consistently ahead of or behind
the other) this should work fine. (I'm not going to worry about
leap seconds for now -- this only real need for this is to sync up
a bunch of machines for Kerberos.)

--lyndon

August 1997

Original source file: tacgps.9708
Source: http://ftp.tapr.org/product_docs/TAC2/mail_archives/tacgps.9708

1. [TAPR-BB:363] Totally Accurate Clock build note

From: Robert Winingham <kc5ejk@onramp.net>
Date: Thu, 7 Aug 1997 02:42:21 -0500 (CDT)
To: wd5ivd@tapr.org
Message-ID: <v03102801b00f299345f8@[206.50.127.22]>
Rendered body type: text/plain

This message was submitted by Robert Winingham <kc5ejk@onramp.net> to list
tapr-bb@tapr.org. If you forward it back to the list, it will be distributed
without the paragraphs above the dashed line. You may edit the Subject: line
and the text of the message before forwarding it back.

If you edit the messages you receive into a digest, you will need to remove
these paragraphs and the dashed line before mailing the result to the list.
Finally, if you need more information from the author of this message, you
should be able to do so by simply replying to this note.

---------- Message requiring your approval ----------
Sender: Robert Winingham <kc5ejk@onramp.net>
Subject: Totally Accurate Clock build note

I finished the TAC-2 board and it passed all power and logic tests.
If UPS ever delivers the Digi-Key right-angle OSX/MCX connectors,
then I can plug in the Trimble active antenna to the ONCORE-VP GPS.

The following are some build notes and possible corrections
to the assemble manual.

GPS:
The Motorola VP picture on the TAPR www site looks different
that the unit I received.
  (so please put an updated gif on the tape.org ONCORE page)

 1. One big difference is the antenna socket in not right angle
    mine is pointed up from the board.

 2. There are RF covers on both side of the GPS that adds depth
     to my unit. The supplied board to board 3/8 stand-offs are ok
     but The TAC-2/GPS unit will need longer than the included
     3/4 inch standoffs before mounting in a case.

 3. I would not use the screws with the washer for connecting the
     ONCORE gps BPC to the standoffs, remove washer or use
     a plastic spacer. There are parts very close to the holes.

--- POWER:
A.
 I found a PC 3.5 Disk Drive adapter Power Cable at Radio Shack
 part number 278-761 (a dual Y cable , so you get two connectors)

The part doesn't fit the male header with out cutting 1/16 inch
off the 4 pin female connector 1/8 inch wide locking notch. Filing
off the locking bump also works but you then need all four female
pins for a tight fit.
   (We MAC people don't use this type of disk power cable but it was
    easy to find)
B.
Optional switching regulator:

1. I see RFC2 is also part of the switching regulator option and
   should be in the bold outline.

   I would like to SEE a digi-key part number for items not
   included in the TAPR kit

RFC2 I guess is same as RFC1 ?
CE1 needs to fit between the boards and what is suggested voltage
     rating ?
Z1   will 1 amp rating do ?

----------   Assembly: Build notes   --------

We need a picture in the build notes like the one on tapr.org

Page 2 The parts list: Resistors

Put a note on R6 180 ohm and R6 1 Kohm, so we don't think that having
two R6 it is a typo. R6 is part of two optional battery backup.
The POWER schmetic has R6 listed as TBD. A chart would help.

Page 3 :
My kit did not have the parts to attach the 7805 regulator to the
heat sink. I did plan to use the switching regulator

Page 5 :
Resistor : Solder and clip leads (6) should be 4

Page 6 :
hint:
Do RP1 last after RP2-RP5 as RP1 is taller.

Page 7 :
1. it is easy to place the headers for P1 and P2 in the wrong holes.
   There are three ways to place the header but only two ways look correct
   as that places pin one in the square hole.

   When one looks at the PC board pattern from the botton you
   can see that only the middle two set of holes will work.

```
   o 6 o   o 9 o   o
   o   o   o   o   o
   o   o   o   o   o
   o 1 o   o   o 5 o
```

   The instruction about - like a IC socket -
   should be changed to use to - use the middle holes.-
   and the instructions art work page 18 can thicken the
   lines so that the placement is VERY obvious.

   The header part don't have any pin numbers anyway and
   the numbers on the PC board have the label for pin one
   on the right of the hole and pin 5 label is on the left
   of the hole. I guess since there was not room for a label
   of pin 10, you just labeled pin 9

```
   6   7   8   9  10
   o 6 o   o 9 o   o
   o   o   o   o   o
   o   o   o   o   o
   o 1 o   o   o 5 o
   1   2   3   4   5
```

Page 7 :
using the ONCORE VP - I was very careful to mount the part on the
underside of PCB but I started to use the extra 2x5 male header
as I almost over looked the female header included in the
mounting pouch. A double heads up here.

Page 8 :   7805 Voltage regulator.

1. The length of the 4-40 screw is not given just a dash.
    and was not in my kit.

2. I had to look all over the instructions to find out why I had to use
   the Z hole for the middle leg if I was not going to use the
   7805 voltage tweak.
   -- It is another of the cunning cut trace to activat option design --

  ** But the power schematic notes says to place in Z instead of ground.
     implying that the ground hole was a option.
     Needs to say in the power schmetic :
     Always put in Z hole and cut the trace to use option.

3. The +5 volt power tweak is not covered on page 17 -USER OPTIONS.
    but it is in the topic list for that page.

The only reference to the +5 volt power tweak is under the
Theory of Operations -- page 16

4. Theory of operations page 16 - Sheet 4- POWER
This needs some work as it must be from the last revision as
several part are numbered wrong. It talks about D7-D8
(should be ??) and R8+R9 should be (R10-R11)
R8 is part of the antenna bias option.

5. There is no Q1 for the ONCORE-VP GPS option or a R6-R7.
A cut jumper and a jumper plug on JP3 is all that is needed.

6. Q1 is for the next item on the page.
3d Trimble-SK-8 (needs so (SOME) words here)

What mail list do we use for the TAC-2 kit as there still is no
GPS mail list ???

73

Bob - Dallas,TX --- kc5ejk@onramp.net or kc5ejk@amsat.org ---

2. [TACGPS:534] Re: [APRSSIG:15069] Totally Accurate Clock comments

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Thu, 7 Aug 1997 13:06:25 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <33EA0C82.811720B9@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Concerning the TAC-2, Bob (KC5EJK) gave some really great feedback. Let
me respond in public to them:

> I finished the TAC-2 board and it passed all power and logic tests.
> If UPS ever delivers the Digi-Key right-angle OSX/MCX connectors,
> then I can plug in the Trimble active antenna to the ONCORE-VP GPS.
>
> The following are some build notes and possible corrections
> to the assemble manual.
>
> GPS:
> The Motorola VP picture on the TAPR www site looks different
> that the unit I received.
> (so please put an updated gif on the tape.org ONCORE page)
>
> 1. One big difference is the antenna socket in not right angle
> mine is pointed up from the board.
>
When we were trying to pick the ONCORE model to offer there was
some confusion on parts numbers & options. I specified that we
get the version with the good RF shielding, but the photo (gleaned
from Motorola) shows the unshielded version. I >thought< we were
getting the version with the right-angle connector, but I guess
I goofed! I have always strongly recommended that people use the
right-angle MCX connectors for 2 reasons -- they avoid any possible
clearance problems and they are a LOT easier to install if you don't
have the $pecial crimping tools.

When you finally get the connectors, there have been some sub-optimum
suggestions on the installation of the small (~3/16" diameter) shield
cover -- my advice is that you DO NOT solder it in place. Test the
cable without the cover being installed. If you are sure the connector
is OK, then put the cover in place with the convex "dimple" pointing
up after putting the small teflon disk in place. With a nail or a
center punch, push down on the "dimple" (sorta like pushing on the
bottom of an oil can) and the cap will expand into the proper position
with no soldering. My personal "trick" is to put a ~1/8" drill bit
into my drill press, and then use the drill press (motor off!!) as
an arbor press.

> 2. There are RF covers on both side of the GPS that adds depth
> to my unit. The supplied board to board 3/8 stand-offs are ok
> but The TAC-2/GPS unit will need longer than the included

>   3/4 inch standoffs before mounting in a case.

The 3/4" standoffs miss by about 1/32" of being long enough. One
washer will probably solve the problem (at least it does on the
several TAC-2s I've built).

> 3. I would not use the screws with the washer for connecting the
>   ONCORE gps BPC to the standoffs, remove washer or use
>   a plastic spacer. There are parts very close to the holes.

In laying out the PCB, I tried really hard to make sure there was
enough room around all of the mounting holes so that there would
be no possibility of shorts. One trick I found works really nice --
I use 4-40 flat-head screws to go thru the PCB. The PCB's mounting
holes are intentionally a bit large (they are 0.140" diameter, where
the normal clearance hole for a 4-40 is 0.125") to allow for tolerance
errors in the drilling. The conical sides of a flat-head screw wedge
in very nicely.

> --- POWER:
> A.
> I found a PC 3.5 Disk Drive adapter Power Cable at Radio Shack
> part number 278-761 (a dual Y cable , so you get two connectors)
>
> The part doesn't fit the male header with out cutting 1/16 inch
> off the 4 pin female connector 1/8 inch wide locking notch. Filing
> off the locking bump also works but you then need all four female
> pins for a tight fit.

All the 4-pin 0.1" pin spacing polarized disk-drive power connectors
I've tried fit the polarized MOLEX power connector just fine with no
surgery required. The MOLEX connector I chose is not precisely the one
you find on disk drives, but they seem to mate properly. Guess I
didn't try all the connector variants that are out there!

>   (We MAC people don't use this type of disk power cable but it was
>   easy to find)
> B.
> Optional switching regulator:
>
> 1. I see RFC2 is also part of the switching regulator option and
>   should be in the bold outline.
>
>   I would like to SEE a digi-key part number for items not
>   included in the TAPR kit
>
> RFC2 I guess is same as RFC1 ?
> CE1 needs to fit between the boards and what is suggested voltage
>   rating ?
> Z1   will 1 amp rating do ?
>
RFC2 was left out of the switcher bold outline since people who have
RFI problems may want to use it. The PCB default is that it is
jumpered. On my prototypes, I used the same 6.8 uH choke as in RFC1,
but the voltage drop across it is about 0.15v. A lower resistance
choke is desirable. A simple, cheap choke to use can be made in a
few minutes. Take some #30 wire-wrap wire and wind about 10-20 turns
on a 1 watt resistor (value 100 ohms or bigger, not critical) as a
coil form.

Re CE1: I designed the PCB around a capacitor (which is a standard
size) which I purchased a huge quantity of for a few bux at a hamfest.
I provided a bag with several hundred to TAPR and requested that one
be sent with each kit. I guess that this didn't happen. If you are
using the PT switcher and need a capacitor, let me know and I'll get
one to you.

Re Z1: 1 Amp is fine. It was included 'cuz Power Trends show it as
recommended on their schematic as a surge supressor. In normal
operation it does nothing.

> ----------   Assembly: Build notes   --------
>
> We need a picture in the build notes like the one on tapr.org
>
> Page 2 The parts list: Resistors
>
> Put a note on R6 180 ohm and R6 1 Kohm, so we don't think that having
> two R6 it is a typo. R6 is part of two optional battery backup.

> The POWER schmetic has R6 listed as TBD. A chart would help.

There was supposed to be some text on the R6 selection, which depends
on the specific battery you use in the BBRAM. Typically, the 180 ohm
is fine if you use a 3.6v NiCd or the Gold Cap, 1k is a good value
if you are using the +12v source to drive a 9v NiCd.

> Page 3 :
> My kit did not have the parts to attach the 7805 regulator to the
> heat sink. I did plan to use the switching regulator
>
> Page 5 :
> Resistor : Solder and clip leads (6) should be 4
>
> Page 6 :
> hint:
> Do RP1 last after RP2-RP5 as RP1 is taller.
>
> Page 7 :
> 1. it is easy to place the headers for P1 and P2 in the wrong holes.
>   There are three ways to place the header but only two ways look correct
>   as that places pin one in the square hole.

The "outlier" holes at P1 & P2 are there to provide solder pads in case
the
user needs to pick up other RS232 signals.

>   When one looks at the PC board pattern from the botton you
>   can see that only the middle two set of holes will work.
>
>   o 6 o   o 9 o   o
>   o   o   o   o   o
>   o   o   o   o   o
>   o 1 o   o   o 5 o
>
>   The instruction about - like a IC socket -
>   should be changed to use to - use the middle holes.-
>   and the instructions art work page 18 can thicken the
>   lines so that the placement is VERY obvious.
>
>   The header part don't have any pin numbers anyway and
>   the numbers on the PC board have the label for pin one
>   on the right of the hole and pin 5 label is on the left
>   of the hole. I guess since there was not room for a label
>   of pin 10, you just labeled pin 9
>
>   6   7   8   9 10
>   o 6 o   o 9 o   o
>   o   o   o   o   o
>   o   o   o   o   o
>   o 1 o   o   o 5 o
>   1   2   3   4   5

The other problem with these headers is that conventional wisdom for
such
headers normally numbers the pin connections like

```
        1  3  5  7  9
        2  4  6  8  10
```

but for RS232 connectors the numbering goes like

```
        1  2  3  4  5
         6  7  8  9
```

Also, in the old original PVT-6 (a.k.a. ONCORE BASIC) Motorola numbered
pins on the 10-pin header like

```
        1  2  3  4  5
        6  7  8  9  10
```

I am 99-44/100% certain that the PCB and schematics are correct, but I
caution people to be very, very careful about the relation between pin
numbers and wires when using these connectors. I know of one instance
when an ONCORE receiver was fried because of failure to heed these
warnings!

> Page 7 :

> using the ONCORE VP - I was very careful to mount the part on the
> underside of PCB but I started to use the extra 2x5 male header
> as I almost over looked the female header included in the
> mounting pouch. A double heads up here.
>
> Page 8 :   7805 Voltage regulator.
>
> 1. The length of the 4-40 screw is not given just a dash.
>   and was not in my kit.

Whatever fits, use it! Note that the hole for the 7805 is insulated.
When used with the insulated (black anodized) heat sink, the case of
the regulator is electrically floating, and the "Z" center lead on the
regulator gets it ground thru the default "V" jumper at R11. If you need
to tweak the +5v supply voltage (as was necessary with one Garmin GPS-20
I have), add R10/R11 and cut the "V" jumper.

> 2. I had to look all over the instructions to find out why I had to use
>   the Z hole for the middle leg if I was not going to use the
>   7805 voltage tweak.
>   -- It is another of the cunning cut trace to activat option design --
>
>   ** But the power schematic notes says to place in Z instead of ground.
>   implying that the ground hole was a option.
>   Needs to say in the power schmetic :
>   Always put in Z hole and cut the trace to use option.
>
> 3. The +5 volt power tweak is not covered on page 17 -USER OPTIONS.
>   but it is in the topic list for that page.

Just like using the toilet, the paperwork is the last thing you need to
do!
I have been travelling on business a lot this summer and I am behind the
power curve in doing the final text editing. Sorry!

>   The only reference to the +5 volt power tweak is under the
>   Theory of Operations -- page 16
>
> 4. Theory of operations page 16 - Sheet 4- POWER
>   This needs some work as it must be from the last revision as
>   several part are numbered wrong. It talks about D7-D8
>   (should be ??) and R8+R9 should be (R10-R11)
>   R8 is part of the antenna bias option.
>
> 5. There is no Q1 for the ONCORE-VP GPS option or a R6-R7.
>   A cut jumper and a jumper plug on JP3 is all that is needed.
>
> 6. Q1 is for the next item on the page.
>   3d Trimble-SK-8 (needs so (SOME) words here)

Yes, the theory of operation text needs work, and its my fault!

> --
>
> What mail list do we use for the TAC-2 kit as there still is no
> GPS mail list ???

The TAPR folks need to decide what to do about this. For getting the
TAC-2 out the door, we had the private tacgps mailing list, and I'm not
sure who is on the list now! I think we need such a mail exploder for
those working on advanced & wierd GPS things. On the TAC-2 front, one of
the next topics will be work on the TOC (TAC Oscillator Controller)
which
will allow you to stabilize ("discipline") a crystal oscillator to
levels
of ~1:10e9 to 1:10e10 (comparable to a Rubidium) -- we have a conceptual
design, but hardware doesn't exist yet.

There is new software in the offing -- right now I am testing TAC32 -- a
new W95/NT 32-bit package (by WB2TNL) that does SHOWTIME properly; in
the
NT environment, the PC's clock is kept within 1 msec of UTC with TAC32!
In
W95, the MessDOS 55 msec clock resolution limits the performance, but
TAC32
keeps it within one clock tick. Folks are beginning work on *NIX xntpd
support for the TAC -- I hope there will be some good news on the LINUX
fron RSN (RSN = Real! Soon! Now! -- the typical answer on when W95 will
become W9? which will be the same thing as NT).

Although it has been rather dormant recently, the gps-timing mail
exploder
archives are available for public view -- set a news server to point to

     news://aleph.gsfc.nasa.gov

and subscribe to gps-timing. Of course, all the "publik" archives for my
TAC project are also on aleph at

     ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/

73 de Tom, W3IWI

3. [TACGPS:535] Re: [APRSSIG:15069] Totally Accurate Clock

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Thu, 7 Aug 1997 15:15:11 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <v03020904b00fdc3d8780@[208.134.134.40]>
Rendered body type: text/plain

>When we were trying to pick the ONCORE model to offer there was
>some confusion on parts numbers & options. I specified that we
>get the version with the good RF shielding, but the photo (gleaned
>from Motorola) shows the unshielded version. I >thought< we were
>getting the version with the right-angle connector, but I guess
>I goofed! I have always strongly recommended that people use the
>right-angle MCX connectors for 2 reasons -- they avoid any possible
>clearance problems and they are a LOT easier to install if you don't
>have the $pecial crimping tools.
>

The good RF version of the VP board we are getting from Syngery do not come
in with a right-angle end connector.

The choice would be to have poorer RF and a right angle or better RF and a
straight.

I talked to Larry Mackey in depth on this several months ago.

We should be making the right angle MCX/OCX connector with cable a
permanent inventory item to order.

Cheers - Greg

Greg Jones, WD5IVD
Austin, Texas
wd5ivd@tapr.org
http://www.tapr.org/~wd5ivd

    "Before you become too entranced with gorgeous gadgets
     and mesmerizing video displays, let me remind you that
     information is not knowledge, knowledge is not wisdom,
     and wisdom is not foresight. Each grows out of the other
     and we need them all."   -Arthur C. Clarke

4. [TACGPS:536] Power connector part numbers

From: gregory.beat@mediaone.net (Gregory Beat)
Date: Thu, 7 Aug 1997 21:06:32 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <33EA7DD4.3403A0CE@mediaone.net>
Rendered body type: text/plain

> Bob - Dallas,TX --- kc5ejk@onramp.net or kc5ejk@amsat.org ---
> wrote:
>
>--- POWER:
>I found a PC 3.5 Disk Drive adapter Power Cable at Radio Shack
>part number 278-761 (a dual Y cable , so you get two connectors)
>
> The part doesn't fit the male header with out cutting 1/16 inch
> off the 4 pin female connector 1/8 inch wide locking notch. Filing
> off the locking bump also works but you then need all four female
> pins for a tight fit.
>   (We MAC people don't use this type of disk power cable but it was
>   easy to find)

The Digi-Key part numbers (please double check with catalog
or at their web site on-line catalog) for the power connectors
on the TAC-2 are:

Male header on TAC-2 PC board (included with kit)
4 circuit header .100 straight friction lock WM4202-ND

IF you want the right angle version for a lower profile
4 circuit header .100 right angle friction lock WM4302-ND

Matching 4 pin female connector
4 circuit terminal housing .100 (with lock) WM2002-ND

DO NOT forget the terminals for the female connector
Crimp terminal .100 ....
WM2200-ND

Hope this helps any TAC-2 builders out there looking for these Digi-Key
part numbers.

73

G. Beat
W9GB

5. [TACGPS:537] New Motorola Marketing

From: gregory.beat@mediaone.net (Gregory Beat)
Date: Thu, 7 Aug 1997 22:39:12 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <33EA939D.593D5296@mediaone.net>
Rendered body type: text/plain

Found this new addition on Motorola's GPS Oncore web page .....

Precision Timing and Synchronization

A sub-set of Motorola GPS capability, timing applications are becoming
increasingly
important to the telecommunications, computer networking and other
industries where
highly accurate synchronized timing devices are required. Motorola GPS
precision timing
applications include synchronization of cellular site signals to help
expand cellular telephone
coverage, radio frequency stabilization, synchronization of internal
clocks across LANs
and WANs, and timing of lightning flashes for meteorological tracking.

Recently, Motorola, in collaboration with Teleflex Incorporated, began
developing an
integrated GPS receiver and antenna for the precision time and
frequency industry,
eliminating the need for expensive coaxial cable and avoiding problems
with RF signal loss.

W9GB

6. [TACGPS:538] Travelling Again -- Alaska this time

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Fri, 8 Aug 1997 15:19:48 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <33EB7D21.7309@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

I'll be away in Alaska for the next ~10 days -- doing some GPS
measurements for science, teaching some high school kids about
the wonders of science & technology in Valdez, Copper Center,
Glenallen, McCarthy and other locations in the interior, and
then doing some astrogeopolitical business (NASA vs NOAA vs LockMart
[your one-stop defense contractor] vs the Teamsters) at my station
near Fairbanks. Back from the 21st thru the 27th and then off for
a week for some astrogeoornithological (i.e. for the birds!) meetings
in Brazil. This is a 50,000 mile summer for me this year.

Tom

7. [TACGPS:540] Showtime problem

From: "John K. Pringle" <jpringle@gte.net>
Date: Tue, 12 Aug 1997 09:45:34 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCA70B.D2BE58A0@1Cust111.max10.orlando.fl.ms.uu.net>
Rendered body type: text/plain

I recently completed the TAC-2 project including installation of my GPS-20. Everything seems to be operating normally except when I try to run SHOWTIME I get the following error message: " Device I/O error in line 1 of module SHWTM33D at address 0B1F:0696" and the program halts. The 1 PPS beeps are OK and I think initialization at 4800 kbps is OK. I edited SHOWTIME.GPS and inserted correct LAT, LON and altitude. Can anyone tell me what causes this error and how to correct it?

Thanks.

John

jpringle@gte.net

8. [TACGPS:541] Re: Showtime problem

From: "Steven R. Bible" <srbible@gate.net>
Date: Tue, 12 Aug 1997 19:53:47 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19970812195631.0083f380@pop.gate.net>
Rendered body type: text/plain

John, there's a SHOWTIME .GPS example on the diskett for the GPS-20. The receiver type needs to be set to GPS-20, the default SHOWTIME.GPS is for the ONCORE.

- Steve

At 09:45 AM 8/12/97 -0500, you wrote:
>I recently completed the TAC-2 project including installation of my GPS-20. Everything seems to be operating normally except when I try to run SHOWTIME I get the following error message: " Device I/O error in line 1 of module SHWTM33D at address 0B1F:0696" and the program halts. The 1 PPS beeps are OK and I think initialization at 4800 kbps is OK. I edited SHOWTIME.GPS and inserted correct LAT, LON and altitude. Can anyone tell me what causes this error and how to correct it?
>
>Thanks.
>
>John
>
> jpringle@gte.net
>
>
>

- Steve, N7HPR
(n7hpr@tapr.org)

9. [TACGPS:542]

From: "Charles E. Heisler K3VDB" <cheisler@cyberia.com>
Date: Tue, 19 Aug 1997 19:58:47 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19970819205522.006a0988@cyberia.com>
Rendered body type: text/plain

I am a late comer to the list. I was wondering if any one saved some of the more interesting discussions heretofore regarding the TAC-2. If it would be possible for you to send them to me direct I would appreciate it. Please send me a note first so I don't get multiple copies.

Thank you
Charlie K3VDB
cheisler@cyberia.com

10. [TACGPS:543] Oncore VP+Lowe antenna?

From: Bill Broadley <bill@math.ucdavis.edu>
Date: Wed, 20 Aug 1997 14:40:00 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199708201939.MAA08361@proto.math.ucdavis.edu>
Rendered body type: text/plain

Anyone using an oncore VP with a Lowe antenna?

I'm concerned about the 25ma rating of the mcx port on the VP board, and the
32 ma typical power rating on the antenna. Close enough? Working
well for anyone?

--
Bill Broadley   Bill@math.ucdavis.edu   UCD Math Sys-Admin
Linux is great.   http://math.ucdavis.edu/~bill   PGP-ok

11. [TACGPS:544] TAC (fwd)

From: "Henk Uijterwaal (RIPE-NCC)" <henk@ripe.net> (by way of "Steven R. Bible" <srbible@gate.net>)
Date: Wed, 20 Aug 1997 16:50:12 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19970820013058.0083fb20@pop.gate.net>
Rendered body type: text/plain

Hi,

I just finished building my TAPR TAC kit with a Motorola Oncore
VP as the GPS unit. The kit passed all tests described in the manual, but
when I connect it to a computer, it doesn't seem to work.

When I start the clock program from an MSDOS shell:

    c:\tac showtime showtime.gps

I get a message "pulses look good", followed by a pattern on the screen
that looks like:

     ----###----###---###---###---

(4 or 5 yellow boxes connected with straight lines). The program
then says:

  Init @4800 @9600
  .

And then nothing... It doesn't respond to keyboard input either,
the only way I can get out of it, is by forcing Windows to close
the shell.

I have determined our position with another GPS receiver from Motorola
(their "Oncore evaluation kit") and put that into the config file.
This unit found 4 to 5 satelites, so their should be a satelite signal in
our office, the antenna is sitting in the window, we're on the top floor
of the highest building in the area.

The computer we use is a standard Dell Win95 PC, with the TAC
connected to the com1 port (given that I get pulses, I guess that I'm
using the right connector). The cable is a standard D9 to D9 cable
from the local computer shop.

Any ideas what is wrong here?

Henk

Henk Uijterwaal   Email: henk.uijterwaal@ripe.net
RIPE Network Coordination Centre   WWW: http://www.ripe.net/home/henk
Singel 258   Phone: +31.20.5354414
1016 AB Amsterdam   Fax: +31.20.5354445
The Netherlands   Home: +31.20.6651962

%DCL-E-NOCFFE, unable to locate coffee - keyboard input suspended.

12. [TACGPS:545] Re: Oncore VP+Lowe antenna?

From: Dave Martindale <davem@cs.ubc.ca>
Date: Wed, 20 Aug 1997 17:11:15 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <l03102000b0211a14b42e@[198.162.38.159]>
Rendered body type: text/plain

>Anyone using an oncore VP with a Lowe antenna?
>
>I'm concerned about the 25ma rating of the mcx port on the VP board, and the
>32 ma typical power rating on the antenna. Close enough? Working
>well for anyone?

The 32 mA rating must be worst-case manufacturing tolerances, temperature,
and voltage. My Lowe antenna is measured to draw about 22 mA at room
temperature and 5 V power supply. I've also corresponded with someone
at Lowe, who said they had measured a number of them and never found
a current draw more than 25 mA.

So you should be safe.

(I actually use the antenna on a GPS 20, which is theoretically rated
for 15 mA. It has run for days with no apparent problem).

        Dave

13. [TACGPS:546] Re: Oncore VP+Lowe antenna?

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Sun, 24 Aug 1997 16:29:29 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <34009837.2532@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Bill Broadley wrote:
>
> Anyone using an oncore VP with a Lowe antenna?
>
> I'm concerned about the 25ma rating of the mcx port on the VP board, and the
> 32 ma typical power rating on the antenna. Close enough? Working
> well for anyone?
>
> --
> Bill Broadley   Bill@math.ucdavis.edu   UCD Math Sys-Admin
> Linux is great.   http://math.ucdavis.edu/~bill   PGP-ok

I'm back briefly between trips.

The Motorola "25ma" is just a nominal value. I've pulled as much as
50 ma with no problems.

Tom

14. [TACGPS:547] Re: Oncore VP+Lowe antenna?

From: Bill Broadley <bill@math.ucdavis.edu>
Date: Sun, 24 Aug 1997 16:36:06 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199708242132.OAA13762@proto.math.ucdavis.edu>
Rendered body type: text/plain

> I'm back briefly between trips.
>
> The Motorola "25ma" is just a nominal value. I've pulled as much as
> 50 ma with no problems.
>

Thanks, I've received other encouragements as well (i.e. observed
load lower then rates on the lowe), and people who it's working for.

I ordered mine last week, many thanks.

> Tom
>

--
Bill Broadley   Bill@math.ucdavis.edu   UCD Math Sys-Admin
Linux is great.   http://math.ucdavis.edu/~bill   PGP-ok

15. [TACGPS:524] Issues re: TAC-2 assembly.

From: mdf@angoss.com (Matthew Francey) (by way of "Steven R. Bible" <srbible@gate.net>)
Date: Sun, 24 Aug 1997 20:35:13 -0400
To: wd5ivd@tapr.org
Message-ID: <3.0.1.32.19970824203513.007f8340@pop.gate.net>
Rendered body type: text/plain

I got my TAC-2 working on the weekend. Hundreds of dollars to just
see an LED blink every second ... :-)

Some questions/comments:

1. Currently, I'm burning 12V down to 5 and this makes things warmer than
   I prefer. The assembly manual mentions 3 possible "high efficiency"
   switching power supplies. Can I just select one at random? Two are the
   same, except for a "heat tab" -- does one need the "heat tab"?

2. There are a number of glitches in the assembly manual, though none of
   them are even close to fatal -- incorrect lead-counts in 3-4 places,
   and for ONCORE VP installation, one has to set a jumper to "I", not to "N"
   as the manual claims.

3. Is there a Linux or similar version of SHOWTIME?

4. [This isn't really a TAC issue, but hey] Playing around with the ONCORE's
   command set, I was looking at the "broadcast data". The GPS signal
   specification says that "sub-frame 4, page 17" is a "special message"
   which can be set at the "discretion of the system operator". It is
   22 characters, ASCII encoded.

   Earlier today, it seems that the "discretion" was:

               45HF16-UAEVT492W+14RR0

   If this isn't some US military secret, can someone tell me what this
   might mean?

Thanks!

16. [TACGPS:525] Re: Issues re: TAC-2 assembly.

From: "Steven R. Bible" <srbible@gate.net> (by way of "Steven R. Bible" <srbible@gate.net>)
Date: Sun, 24 Aug 1997 20:35:23 -0400
To: wd5ivd@tapr.org
Message-ID: <3.0.1.32.19970824203523.007f66c0@pop.gate.net>
Rendered body type: text/plain

I'll try and answer some of your questions Matthew...

At 02:27 PM 7/28/97 -0500, you wrote:
>I got my TAC-2 working on the weekend. Hundreds of dollars to just
>see an LED blink every second ... :-)

You're a true pioneer now :-).

>Some questions/comments:
>
>1. Currently, I'm burning 12V down to 5 and this makes things warmer than
>   I prefer. The assembly manual mentions 3 possible "high efficiency"
>   switching power supplies. Can I just select one at random? Two are the
>   same, except for a "heat tab" -- does one need the "heat tab"?

I use a 9 VDC power supply. Check the Radio Shack catalog.

>2. There are a number of glitches in the assembly manual, though none of
>   them are even close to fatal -- incorrect lead-counts in 3-4 places,
>   and for ONCORE VP installation, one has to set a jumper to "I", not to "N"
>   as the manual claims.

We'll put these in the next rev of the assy man.

>3. Is there a Linux or similar version of SHOWTIME?

Not yet (any way). We hoped that by getting the TAC-2 out it would spur
other software development.

>4. [This isn't really a TAC issue, but hey] Playing around with the ONCORE's
>   command set, I was looking at the "broadcast data". The GPS signal
>   specification says that "sub-frame 4, page 17" is a "special message"
>   which can be set at the "discretion of the system operator". It is
>   22 characters, ASCII encoded.
>
>   Earlier today, it seems that the "discretion" was:
>
>   45HF16-UAEVT492W+14RR0
>
>   If this isn't some US military secret, can someone tell me what this
>   might mean?

I can't help you here.

- Steve, N7HPR
(n7hpr@tapr.org)

17. [TACGPS:532] Regarding TAC Software

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov> (by way of "Steven R. Bible" <srbible@gate.net>)
Date: Sun, 24 Aug 1997 20:36:10 -0400
To: wd5ivd@tapr.org
Message-ID: <3.0.1.32.19970824203610.007ec8c0@pop.gate.net>
Rendered body type: text/plain

Lyndon Nerenberg wrote:
>
> >>>>> "Steven" == Steven R Bible <srbible@gate.net> writes:
>
>   >> 3. Is there a Linux or similar version of SHOWTIME?
>
>   Steven> Not yet (any way). We hoped that by getting the TAC-2 out
>   Steven> it would spur other software development.
>
> I'm still waiting for my TAC kit to arrive, so this is a little ways
> away, but I'm planning to use it to set up a stratum 1 NTP server on
> ve7tcp.ampr.org. Assuming I can get the Oncore RS232 datalink wired
> to the server I'll be writing a monitoring utility that will collect
> info from the receiver, and allow for control of the receiver. I'll
> make the source available once it's stable. It will be written for
> 4.4BSD, but should port easily to Linux.
>
> --lyndon

Sorry I have been out of touch for the past 3 weeks. I was on a business
trip
to two VLBI stations in China (one near Shanghai, the other in the far
west of
China near Urumqi) and was pretty much out of touch. FYI -- they are
using my
original TACs at these (and several other) Chinese stations and I can
report
that GPS in the opposite hemisphere looks pretty much like it does here!
Also,
I can report that the new Garmin GPS II+ works fine at airplane speeds.
I can
also lay claim to doing the first GPS survey of the location of a Kazakh
yurt
whilst riding on a Kazakh horse!

Now on the TAC software, I see that the formerly private TACGPS mailer
has now
been opened up and many questions are flowing in. Be advised that much
of the
early TAC and GPS timing discussion took place via another mailing list,
gps-timing@aleph.gsfc.nasa.gov. For people asking questions, you might
want to
refer to the gps-timing archives. Set a news browser to point to to my
aleph
server:
          news://aleph.gsfc.nasa.gov
and then "subscribe" to the gps-timing entry. This has all the archives
available
for your perusal. In these archives, you will see a lot of postings by
me about
the evolution of my MessDOS SHOWTIME code. You will also see a week-long
burst of
activity on the NTP issues including inputs from Dave Mills ("Dr.NTP",
a.k.a. W3HCF)
and Louie Makamos (WA3YMH).

Regarding NTP support -- here at NASA Goddard, my project has a real
need for
working code. We support the VLBI (Very Long Baseline Interferometry)
data
acquisition systems (1 Gb/s data recorders that record wideband noise
from Quasars
using Hydrogen Maser frequency standards to achieve coherence times of a
few
thousand seconds at X-band = 10e10 Hz) in use at a number of
observatories around
the world (including the Chinese facilities where I was the past few
weeks).

The instrument controller for the telescopes and the VLBI data systems (a.k.a. "FS" = "Field System")is written in LINUX and runs on generic Pentiums. My FS code guru is Ed Himwich (a.k.a. N3HXQ) who is working on the task of supporting the TAC in the LINUX FS software, which should include NTP.

Ed has reported to me that there are problems with the generic NTP code in the earlier LINUX kernals. I know of one (IMHO) serious "glitch" in all the NTP GPS implementations when you are using the ONCORE in the "zero-D" mode I recommend for achieving the highest possible timing accuracy (at levels of tens of nsec). The existing generic NTP GPS code gets the current time from the $GPGGA NMEA message, but $GPGGA is defined as the time >>OF THE LAST VALID POSITION FIX<<. In the zero-D timing mode, the receiver does not do position fixes, but instead uses all the GPS satellite pseudoranges to extract timing info under the assumption that the position is known perfectly; this is incredibly effective for reducing the timing "dither" of Selective Availability (SA) and errors in the broadcast GPS ephemerides. But the time that is reported in the $GPGGA message can be days, weeks or months ago, and does not change since the receiver is not doing position fixes (the same comments apply to the timing info in the $GPRMC NMEA message).

The proper NMEA message to use (if the receiver supports it, and the ONCORE BASIC/VP do) is $GPZDA, which reports the CURRENT GMT (i.e. UTC) time in any mode (and the ZDA message also reports the date, which is missing from the GGA message). Therefore, anyone planning to do some NTP code hacking needs to rewrite xntpd to properly recognize & use the $GPZDA message.

If you plan to do some xntpd hacking, let me also note that the $GPZDA message lags the UTC second by ~0.6 seconds and you should not rely on the arrival of the message for any precise timing functions. For reasons known only to them, Motorola elected to send the $GPxxx messages in alphabetical order, so xxx=ZDA comes last. Before the ZDA message several earlier messages are of variable length. Of particular concern is the $GPGSV satellites-in-view message, which reports on the S/N, az, el for up to 12 satellites in NMEA sentences that contain only 4 satellites of info; therefore you have to plan on a variable number of GSV messages preceeding the ZDA message! c'est la vie!

In SHOWTIME, I read the time from the ZDA message knowing it is late. I increment the time just read by one second and then apply the time when the hardware-generated 1PPS pulse arrives on the RS232's DCD pin; the incrementing algorithm includes a carry so that minutes & hours roll-over properly. In MessDOS, this works to within the resolution of the DOS clock = 1/18 sec = 55 msec. The only time when this gives a hickup is at the time of a leapsecond when the ZDA message reports seconds counts of :58, :59, :60 and then :00. SHOWTIME ends up displaying two successive :00 second readings.

Regarding SHOWTIME: As you doubtless know by now, SHOWTIME is an MessDOS

"hack" that I
wrote in compiled QuickBasic 4.5. Many of the problems people report
concern the fact
that QB's serial port support is verey minimal, and can lead to bizzare
behavior when
running in a DOS box under Windows. I put aside any work on SHOWTIME a
number of months
ago to try to get the TAC-2 hardware "out the door". SHOWTIME 3.34 sorta
works, but
is not as reliable as I'd like to see. Rick Hambly (WB2TNL) has been
woring on an
improved Windoze-friendly version, but the pressures of getting the
TAC-2 hardware
ready and a lot of business travel have precluded us spending any time
together to
make progress. I have not release the SHOWTIME code to the public
because it needs
some grammatical cleanup (it has a helluva lot of lines REMmed out from
earlier
abortive tests!) and because I don't want to waste time trying to
explain its
philosophy and the myriad "tricks" I had to play to make it work well in
an
obsolete language running in obsolete DOS!

Finally -- I think all the newcomers know, but my "official" TAC
repository is my
aleph ftp file server:
    ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/
where you will find plots showing results, text info, software, etc.

73 de Tom, W3IWI

18. [TACGPS:533] Re: Regarding TAC Software

From: Lyndon Nerenberg <lyndon@ve7tcp.ampr.org> (by way of "Steven R. Bible" <srbible@gate.net>)
Date: Sun, 24 Aug 1997 20:36:25 -0400
To: wd5ivd@tapr.org
Message-ID: <3.0.1.32.19970824203625.007ea940@pop.gate.net>
Rendered body type: text/plain

Thanks for the update, Tom.

What I had in mind for the local NTP clock was to write a GPS
controller program that would handle all the RS232 communications
with the Oncore and place the gleaned information into a shared
memory segment. Other apps (NTP, CGI web monitor tool) would look
into the SHM segment for clock info. xntpd would use the 1PPS on
the CD pin for its ticks, and would poke into the SHM segment for
the absolute time. As long as the SHM segment and the 1PPS are within
one second of each other (and one is consistently ahead of or behind
the other) this should work fine. (I'm not going to worry about
leap seconds for now -- this only real need for this is to sync up
a bunch of machines for Kerberos.)

--lyndon

19. [TACGPS:534] Re: [APRSSIG:15069] Totally Accurate Clock comments

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov> (by way of "Steven R. Bible" <srbible@gate.net>)
Date: Sun, 24 Aug 1997 20:36:49 -0400
To: wd5ivd@tapr.org
Message-ID: <3.0.1.32.19970824203649.007e2100@pop.gate.net>
Rendered body type: text/plain

Concerning the TAC-2, Bob (KC5EJK) gave some really great feedback. Let
me respond in public to them:

> I finished the TAC-2 board and it passed all power and logic tests.
> If UPS ever delivers the Digi-Key right-angle OSX/MCX connectors,
> then I can plug in the Trimble active antenna to the ONCORE-VP GPS.
>
> The following are some build notes and possible corrections
> to the assemble manual.
>
> GPS:
> The Motorola VP picture on the TAPR www site looks different
> that the unit I received.
>   (so please put an updated gif on the tape.org ONCORE page)
>
> 1. One big difference is the antenna socket in not right angle

>   mine is pointed up from the board.
>
When we were trying to pick the ONCORE model to offer there was
some confusion on parts numbers & options. I specified that we
get the version with the good RF shielding, but the photo (gleaned
from Motorola) shows the unshielded version. I >thought< we were
getting the version with the right-angle connector, but I guess
I goofed! I have always strongly recommended that people use the
right-angle MCX connectors for 2 reasons -- they avoid any possible
clearance problems and they are a LOT easier to install if you don't
have the $pecial crimping tools.

When you finally get the connectors, there have been some sub-optimum
suggestions on the installation of the small (~3/16" diameter) shield
cover -- my advice is that you DO NOT solder it in place. Test the
cable without the cover being installed. If you are sure the connector
is OK, then put the cover in place with the convex "dimple" pointing
up after putting the small teflon disk in place. With a nail or a
center punch, push down on the "dimple" (sorta like pushing on the
bottom of an oil can) and the cap will expand into the proper position
with no soldering. My personal "trick" is to put a ~1/8" drill bit
into my drill press, and then use the drill press (motor off!!) as
an arbor press.

> 2. There are RF covers on both side of the GPS that adds depth
>   to my unit. The supplied board to board 3/8 stand-offs are ok
>   but The TAC-2/GPS unit will need longer than the included
>   3/4 inch standoffs before mounting in a case.

The 3/4" standoffs miss by about 1/32" of being long enough. One
washer will probably solve the problem (at least it does on the
several TAC-2s I've built).

> 3. I would not use the screws with the washer for connecting the
>   ONCORE gps BPC to the standoffs, remove washer or use
>   a plastic spacer. There are parts very close to the holes.

In laying out the PCB, I tried really hard to make sure there was
enough room around all of the mounting holes so that there would
be no possibility of shorts. One trick I found works really nice --
I use 4-40 flat-head screws to go thru the PCB. The PCB's mounting
holes are intentionally a bit large (they are 0.140" diameter, where
the normal clearance hole for a 4-40 is 0.125") to allow for tolerance
errors in the drilling. The conical sides of a flat-head screw wedge
in very nicely.

> --- POWER:
> A.
> I found a PC 3.5 Disk Drive adapter Power Cable at Radio Shack
> part number 278-761 (a dual Y cable , so you get two connectors)
>
> The part doesn't fit the male header with out cutting 1/16 inch
> off the 4 pin female connector 1/8 inch wide locking notch. Filing
> off the locking bump also works but you then need all four female
> pins for a tight fit.

All the 4-pin 0.1" pin spacing polarized disk-drive power connectors
I've tried fit the polarized MOLEX power connector just fine with no
surgery required. The MOLEX connector I chose is not precisely the one
you find on disk drives, but they seem to mate properly. Guess I
didn't try all the connector variants that are out there!

>   (We MAC people don't use this type of disk power cable but it was
>   easy to find)
> B.
> Optional switching regulator:
>
> 1. I see RFC2 is also part of the switching regulator option and
>   should be in the bold outline.
>
>   I would like to SEE a digi-key part number for items not
>   included in the TAPR kit
>
> RFC2 I guess is same as RFC1 ?
> CE1 needs to fit between the boards and what is suggested voltage
>   rating ?
> Z1   will 1 amp rating do ?
>
RFC2 was left out of the switcher bold outline since people who have

RFI problems may want to use it. The PCB default is that it is
jumpered. On my prototypes, I used the same 6.8 uH choke as in RFC1,
but the voltage drop across it is about 0.15v. A lower resistance
choke is desirable. A simple, cheap choke to use can be made in a
few minutes. Take some #30 wire-wrap wire and wind about 10-20 turns
on a 1 watt resistor (value 100 ohms or bigger, not critical) as a
coil form.

Re CE1: I designed the PCB around a capacitor (which is a standard
size) which I purchased a huge quantity of for a few bux at a hamfest.
I provided a bag with several hundred to TAPR and requested that one
be sent with each kit. I guess that this didn't happen. If you are
using the PT switcher and need a capacitor, let me know and I'll get
one to you.

Re Z1: 1 Amp is fine. It was included 'cuz Power Trends show it as
recommended on their schematic as a surge supressor. In normal
operation it does nothing.

> ----------   Assembly: Build notes   --------
>
> We need a picture in the build notes like the one on tapr.org
>
> Page 2 The parts list: Resistors
>
> Put a note on R6 180 ohm and R6 1 Kohm, so we don't think that having
> two R6 it is a typo. R6 is part of two optional battery backup.
> The POWER schmetic has R6 listed as TBD. A chart would help.

There was supposed to be some text on the R6 selection, which depends
on the specific battery you use in the BBRAM. Typically, the 180 ohm
is fine if you use a 3.6v NiCd or the Gold Cap, 1k is a good value
if you are using the +12v source to drive a 9v NiCd.

> Page 3 :
> My kit did not have the parts to attach the 7805 regulator to the
> heat sink. I did plan to use the switching regulator
>
> Page 5 :
> Resistor : Solder and clip leads (6) should be 4
>
> Page 6 :
> hint:
> Do RP1 last after RP2-RP5 as RP1 is taller.
>
> Page 7 :
> 1. it is easy to place the headers for P1 and P2 in the wrong holes.
>   There are three ways to place the header but only two ways look correct
>   as that places pin one in the square hole.

The "outlier" holes at P1 & P2 are there to provide solder pads in case
the
user needs to pick up other RS232 signals.

>   When one looks at the PC board pattern from the botton you
>   can see that only the middle two set of holes will work.
>
>   o 6 o   o 9 o   o
>   o   o   o   o   o
>   o   o   o   o   o
>   o 1 o   o   o 5 o
>
>   The instruction about - like a IC socket -
>   should be changed to use to - use the middle holes.-
>   and the instructions art work page 18 can thicken the
>   lines so that the placement is VERY obvious.
>
>   The header part don't have any pin numbers anyway and
>   the numbers on the PC board have the label for pin one
>   on the right of the hole and pin 5 label is on the left
>   of the hole. I guess since there was not room for a label
>   of pin 10, you just labeled pin 9
>
>   6   7   8   9 10
>   o 6 o   o 9 o   o
>   o   o   o   o   o
>   o   o   o   o   o
>   o 1 o   o   o 5 o
>   1   2   3   4   5

The other problem with these headers is that conventional wisdom for
such
headers normally numbers the pin connections like

```
        1  3  5  7  9
        2  4  6  8  10
```

but for RS232 connectors the numbering goes like

```
        1  2  3  4  5
         6  7  8  9
```

Also, in the old original PVT-6 (a.k.a. ONCORE BASIC) Motorola numbered
pins on the 10-pin header like

```
        1  2  3  4  5
        6  7  8  9  10
```

I am 99-44/100% certain that the PCB and schematics are correct, but I
caution people to be very, very careful about the relation between pin
numbers and wires when using these connectors. I know of one instance
when an ONCORE receiver was fried because of failure to heed these
warnings!

> Page 7 :
> using the ONCORE VP - I was very careful to mount the part on the
> underside of PCB but I started to use the extra 2x5 male header
> as I almost over looked the female header included in the
> mounting pouch. A double heads up here.
>
> Page 8 :   7805 Voltage regulator.
>
> 1. The length of the 4-40 screw is not given just a dash.
>   and was not in my kit.

Whatever fits, use it! Note that the hole for the 7805 is insulated.
When used with the insulated (black anodized) heat sink, the case of
the regulator is electrically floating, and the "Z" center lead on the
regulator gets it ground thru the default "V" jumper at R11. If you need
to tweak the +5v supply voltage (as was necessary with one Garmin GPS-20
I have), add R10/R11 and cut the "V" jumper.

> 2. I had to look all over the instructions to find out why I had to use
>   the Z hole for the middle leg if I was not going to use the
>   7805 voltage tweak.
>   -- It is another of the cunning cut trace to activat option design --
>
>   ** But the power schematic notes says to place in Z instead of ground.
>   implying that the ground hole was a option.
>   Needs to say in the power schmetic :
>   Always put in Z hole and cut the trace to use option.
>
> 3. The +5 volt power tweak is not covered on page 17 -USER OPTIONS.
>   but it is in the topic list for that page.

Just like using the toilet, the paperwork is the last thing you need to
do!
I have been travelling on business a lot this summer and I am behind the
power curve in doing the final text editing. Sorry!

>   The only reference to the +5 volt power tweak is under the
>   Theory of Operations -- page 16
>
> 4. Theory of operations page 16 - Sheet 4- POWER
>   This needs some work as it must be from the last revision as
>   several part are numbered wrong. It talks about D7-D8
>   (should be ??) and R8+R9 should be (R10-R11)
>   R8 is part of the antenna bias option.
>
> 5. There is no Q1 for the ONCORE-VP GPS option or a R6-R7.
>   A cut jumper and a jumper plug on JP3 is all that is needed.
>
> 6. Q1 is for the next item on the page.
>   3d Trimble-SK-8 (needs so (SOME) words here)

Yes, the theory of operation text needs work, and its my fault!

> --
>
> What mail list do we use for the TAC-2 kit as there still is no
> GPS mail list ???

The TAPR folks need to decide what to do about this. For getting the
TAC-2 out the door, we had the private tacgps mailing list, and I'm not
sure who is on the list now! I think we need such a mail exploder for
those working on advanced & wierd GPS things. On the TAC-2 front, one of
the next topics will be work on the TOC (TAC Oscillator Controller)
which
will allow you to stabilize ("discipline") a crystal oscillator to
levels
of ~1:10e9 to 1:10e10 (comparable to a Rubidium) -- we have a conceptual
design, but hardware doesn't exist yet.

There is new software in the offing -- right now I am testing TAC32 -- a
new W95/NT 32-bit package (by WB2TNL) that does SHOWTIME properly; in
the
NT environment, the PC's clock is kept within 1 msec of UTC with TAC32!
In
W95, the MessDOS 55 msec clock resolution limits the performance, but
TAC32
keeps it within one clock tick. Folks are beginning work on *NIX xntpd
support for the TAC -- I hope there will be some good news on the LINUX
fron RSN (RSN = Real! Soon! Now! -- the typical answer on when W95 will
become W9? which will be the same thing as NT).

Although it has been rather dormant recently, the gps-timing mail
exploder
archives are available for public view -- set a news server to point to

     news://aleph.gsfc.nasa.gov

and subscribe to gps-timing. Of course, all the "publik" archives for my
TAC project are also on aleph at

     ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/

73 de Tom, W3IWI

20. [TAPR-BB:363] Totally Accurate Clock build note

From: Robert Winingham <kc5ejk@onramp.net> (by way of Greg Jones, WD5IVD) (by way of "Steven R. Bible" <srbible@gate.net>)
Date: Sun, 24 Aug 1997 20:37:03 -0400
To: wd5ivd@tapr.org
Message-ID: <3.0.1.32.19970824203703.007df9e0@pop.gate.net>
Rendered body type: text/plain

This message was submitted by Robert Winingham <kc5ejk@onramp.net> to list
tapr-bb@tapr.org. If you forward it back to the list, it will be distributed
without the paragraphs above the dashed line. You may edit the Subject: line
and the text of the message before forwarding it back.

If you edit the messages you receive into a digest, you will need to remove
these paragraphs and the dashed line before mailing the result to the list.
Finally, if you need more information from the author of this message, you
should be able to do so by simply replying to this note.

---------- Message requiring your approval ----------
Sender: Robert Winingham <kc5ejk@onramp.net>
Subject: Totally Accurate Clock build note

I finished the TAC-2 board and it passed all power and logic tests.
If UPS ever delivers the Digi-Key right-angle OSX/MCX connectors,
then I can plug in the Trimble active antenna to the ONCORE-VP GPS.

The following are some build notes and possible corrections
to the assemble manual.

GPS:
The Motorola VP picture on the TAPR www site looks different
that the unit I received.
  (so please put an updated gif on the tape.org ONCORE page)

 1. One big difference is the antenna socket in not right angle
    mine is pointed up from the board.

 2. There are RF covers on both side of the GPS that adds depth
     to my unit. The supplied board to board 3/8 stand-offs are ok

but The TAC-2/GPS unit will need longer than the included
3/4 inch standoffs before mounting in a case.

3. I would not use the screws with the washer for connecting the
ONCORE gps BPC to the standoffs, remove washer or use
a plastic spacer. There are parts very close to the holes.

--- POWER:
A.
I found a PC 3.5 Disk Drive adapter Power Cable at Radio Shack
part number 278-761 (a dual Y cable , so you get two connectors)

The part doesn't fit the male header with out cutting 1/16 inch
off the 4 pin female connector 1/8 inch wide locking notch. Filing
off the locking bump also works but you then need all four female
pins for a tight fit.
(We MAC people don't use this type of disk power cable but it was
easy to find)
B.
Optional switching regulator:

1. I see RFC2 is also part of the switching regulator option and
should be in the bold outline.

I would like to SEE a digi-key part number for items not
included in the TAPR kit

RFC2 I guess is same as RFC1 ?
CE1 needs to fit between the boards and what is suggested voltage
rating ?
Z1 will 1 amp rating do ?

---------- Assembly: Build notes --------

We need a picture in the build notes like the one on tapr.org

Page 2 The parts list: Resistors

Put a note on R6 180 ohm and R6 1 Kohm, so we don't think that having
two R6 it is a typo. R6 is part of two optional battery backup.
The POWER schmetic has R6 listed as TBD. A chart would help.

Page 3 :
My kit did not have the parts to attach the 7805 regulator to the
heat sink. I did plan to use the switching regulator

Page 5 :
Resistor : Solder and clip leads (6) should be 4

Page 6 :
hint:
Do RP1 last after RP2-RP5 as RP1 is taller.

Page 7 :
1. it is easy to place the headers for P1 and P2 in the wrong holes.
There are three ways to place the header but only two ways look correct
as that places pin one in the square hole.

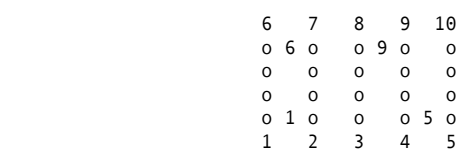
When one looks at the PC board pattern from the botton you
can see that only the middle two set of holes will work.

```
o 6 o   o 9 o   o
o   o   o   o   o
o   o   o   o   o
o 1 o   o   o 5 o
```

The instruction about - like a IC socket -
should be changed to use to - use the middle holes.-
and the instructions art work page 18 can thicken the
lines so that the placement is VERY obvious.

The header part don't have any pin numbers anyway and
the numbers on the PC board have the label for pin one
on the right of the hole and pin 5 label is on the left

of the hole. I guess since there was not room for a label
of pin 10, you just labeled pin 9



Page 7 :
using the ONCORE VP - I was very careful to mount the part on the
underside of PCB but I started to use the extra 2x5 male header
as I almost over looked the female header included in the
mounting pouch. A double heads up here.

Page 8 : 7805 Voltage regulator.

1. The length of the 4-40 screw is not given just a dash.
    and was not in my kit.

2. I had to look all over the instructions to find out why I had to use
   the Z hole for the middle leg if I was not going to use the
   7805 voltage tweak.
   -- It is another of the cunning cut trace to activat option design --

  ** But the power schematic notes says to place in Z instead of ground.
    implying that the ground hole was a option.
    Needs to say in the power schmetic :
    Always put in Z hole and cut the trace to use option.

3. The +5 volt power tweak is not covered on page 17 -USER OPTIONS.
    but it is in the topic list for that page.

    The only reference to the +5 volt power tweak is under the
    Theory of Operations -- page 16

4. Theory of operations page 16 - Sheet 4- POWER
     This needs some work as it must be from the last revision as
      several part are numbered wrong. It talks about D7-D8
      (should be ??) and R8+R9 should be (R10-R11)
      R8 is part of the antenna bias option.

5. There is no Q1 for the ONCORE-VP GPS option or a R6-R7.
   A cut jumper and a jumper plug on JP3 is all that is needed.

6. Q1 is for the next item on the page.
   3d Trimble-SK-8 (needs so (SOME) words here)

What mail list do we use for the TAC-2 kit as there still is no
GPS mail list ???

73

Bob - Dallas,TX --- kc5ejk@onramp.net or kc5ejk@amsat.org ---

21. [TACGPS:536] Power connector part numbers

From: gregory.beat@mediaone.net (Gregory Beat) (by way of "Steven R. Bible" <srbible@gate.net>)
Date: Sun, 24 Aug 1997 20:37:20 -0400
To: wd5ivd@tapr.org
Message-ID: <3.0.1.32.19970824203720.007db860@pop.gate.net>
Rendered body type: text/plain

> Bob - Dallas,TX --- kc5ejk@onramp.net or kc5ejk@amsat.org ---
> wrote:
>
>--- POWER:
>I found a PC 3.5 Disk Drive adapter Power Cable at Radio Shack
>part number 278-761 (a dual Y cable , so you get two connectors)
>
> The part doesn't fit the male header with out cutting 1/16 inch

> off the 4 pin female connector 1/8 inch wide locking notch. Filing
> off the locking bump also works but you then need all four female
> pins for a tight fit.
>   (We MAC people don't use this type of disk power cable but it was
>   easy to find)

The Digi-Key part numbers (please double check with catalog
or at their web site on-line catalog) for the power connectors
on the TAC-2 are:

Male header on TAC-2 PC board (included with kit)
4 circuit header .100 straight friction lock WM4202-ND

IF you want the right angle version for a lower profile
4 circuit header .100 right angle friction lock WM4302-ND

Matching 4 pin female connector
4 circuit terminal housing .100 (with lock) WM2002-ND

DO NOT forget the terminals for the female connector
Crimp terminal .100 ....
WM2200-ND

Hope this helps any TAC-2 builders out there looking for these Digi-Key
part numbers.

73

G. Beat
W9GB

22. [TACGPS:540] Showtime problem

From: "John K. Pringle" <jpringle@gte.net> (by way of "Steven R. Bible" <srbible@gate.net>)
Date: Sun, 24 Aug 1997 20:37:45 -0400
To: wd5ivd@tapr.org
Message-ID: <3.0.1.32.19970824203745.007d5930@pop.gate.net>
Rendered body type: text/plain

I recently completed the TAC-2 project including installation of my GPS-20.
Everything seems to be operating normally except when I try to run SHOWTIME
I get the following error message: " Device I/O error in line 1 of module
SHWTM33D at address 0B1F:0696" and the program halts. The 1 PPS beeps are
OK and I think initialization at 4800 kbps is OK. I edited SHOWTIME.GPS
and inserted correct LAT, LON and altitude. Can anyone tell me what causes
this error and how to correct it?

Thanks.

John

 jpringle@gte.net

23. [TACGPS:541] Re: Showtime problem

From: "Steven R. Bible" <srbible@gate.net> (by way of "Steven R. Bible" <srbible@gate.net>)
Date: Sun, 24 Aug 1997 20:37:50 -0400
To: wd5ivd@tapr.org
Message-ID: <3.0.1.32.19970824203750.007d3860@pop.gate.net>
Rendered body type: text/plain

John, there's a SHOWTIME .GPS example on the diskett for the GPS-20. The
receiver type needs to be set to GPS-20, the default SHOWTIME.GPS is for
the ONCORE.

- Steve

At 09:45 AM 8/12/97 -0500, you wrote:
>I recently completed the TAC-2 project including installation of my
GPS-20. Everything seems to be operating normally except when I try to run
SHOWTIME I get the following error message: " Device I/O error in line 1 of
module SHWTM33D at address 0B1F:0696" and the program halts. The 1 PPS
beeps are OK and I think initialization at 4800 kbps is OK. I edited
SHOWTIME.GPS and inserted correct LAT, LON and altitude. Can anyone tell me
what causes this error and how to correct it?
>
>Thanks.
>
>John
>

> jpringle@gte.net
>
>
>

 - Steve, N7HPR
 (n7hpr@tapr.org)

24. [TACGPS:544] TAC (fwd)

From: "Henk Uijterwaal (RIPE-NCC)" <henk@ripe.net> (by way of "Steven R. Bible" <srbible@gate.net>) (by way of "Steven R. Bible"
Date: Sun, 24 Aug 1997 20:38:12 -0400
To: wd5ivd@tapr.org
Message-ID: <3.0.1.32.19970824203812.007cd4e0@pop.gate.net>
Rendered body type: text/plain

Hi,

I just finished building my TAPR TAC kit with a Motorola Oncore
VP as the GPS unit. The kit passed all tests described in the manual, but
when I connect it to a computer, it doesn't seem to work.

When I start the clock program from an MSDOS shell:

    c:\tac showtime showtime.gps

I get a message "pulses look good", followed by a pattern on the screen
that looks like:

     ----###----###---###---###---

(4 or 5 yellow boxes connected with straight lines). The program
then says:

  Init @4800 @9600
  .

And then nothing... It doesn't respond to keyboard input either,
the only way I can get out of it, is by forcing Windows to close
the shell.

I have determined our position with another GPS receiver from Motorola
(their "Oncore evaluation kit") and put that into the config file.
This unit found 4 to 5 satelites, so their should be a satelite signal in
our office, the antenna is sitting in the window, we're on the top floor
of the highest building in the area.

The computer we use is a standard Dell Win95 PC, with the TAC
connected to the com1 port (given that I get pulses, I guess that I'm
using the right connector). The cable is a standard D9 to D9 cable
from the local computer shop.

Any ideas what is wrong here?

Henk

Henk Uijterwaal   Email: henk.uijterwaal@ripe.net
RIPE Network Coordination Centre   WWW: http://www.ripe.net/home/henk
Singel 258   Phone: +31.20.5354414
1016 AB Amsterdam   Fax: +31.20.5354445
The Netherlands   Home: +31.20.6651962

%DCL-E-NOCFFE, unable to locate coffee - keyboard input suspended.

25. [TACGPS:545] Re: Oncore VP+Lowe antenna?

From: Dave Martindale <davem@cs.ubc.ca> (by way of "Steven R. Bible" <srbible@gate.net>)
Date: Sun, 24 Aug 1997 20:38:21 -0400
To: wd5ivd@tapr.org
Message-ID: <3.0.1.32.19970824203821.007cb4f0@pop.gate.net>
Rendered body type: text/plain

>Anyone using an oncore VP with a Lowe antenna?
>
>I'm concerned about the 25ma rating of the mcx port on the VP board, and the
>32 ma typical power rating on the antenna. Close enough? Working
>well for anyone?

The 32 mA rating must be worst-case manufacturing tolerances, temperature,

and voltage. My Lowe antenna is measured to draw about 22 mA at room
temperature and 5 V power supply. I've also corresponded with someone
at Lowe, who said they had measured a number of them and never found
a current draw more than 25 mA.

So you should be safe.

(I actually use the antenna on a GPS 20, which is theoretically rated
for 15 mA. It has run for days with no apparent problem).

        Dave

26. [TACGPS:546] Re: Oncore VP+Lowe antenna?

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov> (by way of "Steven R. Bible" <srbible@gate.net>)
Date: Sun, 24 Aug 1997 20:38:37 -0400
To: wd5ivd@tapr.org
Message-ID: <3.0.1.32.19970824203837.007c2530@pop.gate.net>
Rendered body type: text/plain

Bill Broadley wrote:
>
> Anyone using an oncore VP with a Lowe antenna?
>
> I'm concerned about the 25ma rating of the mcx port on the VP board, and the
> 32 ma typical power rating on the antenna. Close enough? Working
> well for anyone?
>
> --
> Bill Broadley   Bill@math.ucdavis.edu   UCD Math
Sys-Admin
> Linux is great.   http://math.ucdavis.edu/~bill
PGP-ok

I'm back briefly between trips.

The Motorola "25ma" is just a nominal value. I've pulled as much as
50 ma with no problems.

Tom

27. [TACGPS:547] Re: Oncore VP+Lowe antenna?

From: Bill Broadley <bill@math.ucdavis.edu> (by way of "Steven R. Bible" <srbible@gate.net>)
Date: Sun, 24 Aug 1997 20:38:42 -0400
To: wd5ivd@tapr.org
Message-ID: <3.0.1.32.19970824203842.007c2a70@pop.gate.net>
Rendered body type: text/plain

> I'm back briefly between trips.
>
> The Motorola "25ma" is just a nominal value. I've pulled as much as
> 50 ma with no problems.
>

Thanks, I've received other encouragements as well (i.e. observed
load lower then rates on the lowe), and people who it's working for.

I ordered mine last week, many thanks.

> Tom
>

--
Bill Broadley   Bill@math.ucdavis.edu   UCD Math Sys-Admin
Linux is great.   http://math.ucdavis.edu/~bill   PGP-ok

28. [TACGPS:548] help me

From: "Ken Garlock" <k-garlock@ti.com>
Date: Mon, 25 Aug 1997 09:21:47 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199708251414.JAA19497@dlep1.itg.ti.com>
Rendered body type: text/plain

help me

Happy Computing.

Regards,

Ken Garlock k-garlock@ti.com, (972) 575-4332

29. [TACGPS:549] TAC-2 Power Supply

From: "Eric Rosenberg" <erosenberg@orbcomm.net>
Date: Tue, 26 Aug 1997 14:00:59 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <9707268726.AA872632755@smtp_link.orbcomm.net>
Rendered body type: text/plain

I'm a bit confused about the power supply for the GPS-20 in the TAC-2
kit I've just ordered.

There are mentions of options, and in the latest PSR there's a picture
of a power supply for the GPS-20, yet I can't find anything current on
this subject. Steve Bible's page on the TAPR web site give s some
options, but that's about it.

Can anybody shed some light on the subject...

Thanks!

Eric W3DQ
Washington, DC

erosenberg@orbcomm.net

30. [TACGPS:550] Re: TAC-2 Power Supply

From: clark@tomcat.gsfc.nasa.gov (Tom Clark -- W3IWI)
Date: Tue, 26 Aug 1997 14:23:46 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <35511@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

To answer Eric's questions:

> There are mentions of options, and in the latest PSR there's a picture
> of a power supply for the GPS-20, yet I can't find anything current on
> this subject. Steve Bible's page on the TAPR web site give s some

The GPS-20 requires +5VDC to run it. The TAC-2 PCB has basically 3 options
on how you can do this:

(1) An on-board 7805 regulator, which is furnished with the kit, drops
an 12V input in a lossy, heat-generating mode.

(2) The 7805 can be replaced with a Power Trends switching regulator available
for < $15 from Digikey so you don't waste as many ergs on heat

(3) You can just forget the regulators and feed it +5V directly.

The power connector is a 4-pin (0.1" pin spacing) polarized connector that
is compatible with a normal disk drive. The disk drive interface has both
+5V and +12V pins.

If you use either the (1) or (2) 12V options, the PCB has provisions for an
Uninterruptable Power Supply (UPS) battery to keep the rcvr alive during
brief power failures. A standard "9V" (actually 8.4V) NiCd "transistor radio
battery" will keep the unit running for a couple of minutes if you use the
lossy 7805 or for about 6 minutes if you use the Power Trends switcher.

Eric -- if you are thinking about the TAC for the "professional" application
we discussed en route to Dayton, I would >>STRONGLY<< advise the use of the
Motorola ONCORE instead of the Garmin GPS-20. IMHO, the GPS-20 is an
unreliable "toy" whilst the ONCORE is much more robust receiver.

73, Tom
/ex

31. [TACGPS:552] Re: Showtime problem

From: gregory.beat@mediaone.net (Gregory Beat)
Date: Fri, 29 Aug 1997 21:51:14 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <34078955.9118A729@mediaone.net>
Rendered body type: text/plain

John K. Pringle wrote:

> I recently completed the TAC-2 project including installation of my

> GPS-20. Everything seems to be operating normally except when I try to
> run SHOWTIME I get the following error message: " Device I/O error in
> line 1 of module SHWTM33D at address 0B1F:0696" and the program halts.
> The 1 PPS beeps are OK and I think initialization at 4800 kbps is OK.
> I edited SHOWTIME.GPS and inserted correct LAT, LON and altitude. Can
> anyone tell me what causes this error and how to correct it?

Powered up the TAC-2 with my new antenna and have received a similiar
error.

"Device I/O error in line 1 of module SHWTM33D at address 0A12:0AE6"

I run Showtime in a DOS window on my Windows 95 machine. Experimenting
with a couple of
settings, it appears that Showtime does not like the behavior of the
Win95 screen saver. I understand
that someone was woking with Tom for a Windows version of the Showtime
code. I suggested Retsik
Software for Windows since they wrote the AccuSet 4.1 application and
there are nice
features that could be adopted.

Meanwhile, I shut the Screen saver off.

Greg Beat
W9GB

32. [TACGPS:553] Enclosure for TAC-2

From: gregory.beat@mediaone.net (Gregory Beat)
Date: Fri, 29 Aug 1997 21:51:21 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <34078A2D.E9B2A472@mediaone.net>
Rendered body type: text/plain

There had been some discussion earlier this year and in the latest TAPR
newsletter
that a box may be fabricated for the TAC-2. May I suggets that you look
at
the cases at Lansing Instrament in Ithaca, NY (800)-847-3535 .

There are not many companies that will do enclosures for prototypes or
quantity of
one - they have for other projects.

G. Beat
W9GB

33. [TACGPS:554] Re: Showtime problem

From: "John K. Pringle" <jpringle@gte.net>
Date: Sun, 31 Aug 1997 10:11:22 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCB5FD.CE8AFDA0@1Cust66.max26.orlando.fl.ms.uu.net>
Rendered body type: multipart/mixed

[No readable text body. See the preserved original monthly archive.]
[Inline non-text content: multipart/mixed; 1,745 bytes]

34. [TACGPS:555] Re: Showtime problem

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sun, 31 Aug 1997 22:43:00 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCB667.436DFE60.rick@cnssys.com>
Rendered body type: text/plain

A Windows 95 version is coming!

The ALPHA testing has begun on TAC32. It has some of Showtime's features,
but many others haven't been written yet. It will eventually have all of
Showtime's features and more.

If anyone is desperate enough to want to test this and is willing to run
the risks, send me an e-mail.

Rick Hambly
WB2TNL

-----Original Message-----
From: John K. Pringle [SMTP:jpringle@gte.net]
Sent: Sunday, August 31, 1997 11:05 AM

To: 'tacgps@tapr.org'
Subject: RE: [TACGPS:552] Re: Showtime problem

I solved the Device I/O error message problem by setting the receiver type to 4 (GPS-20) in SHOWTIME.GPS thanks to suggestion from Steve Bible. I thought the program would auto-detect the receiver type but apparently not. I am also running SHOWTIME in a DOS window in Windows 95 but don't seem to have the screen saver problem. Everything looks good as of now. I also would welcome a Windows 95 version of SHOWTIME !

John
W4SF

-----Original Message-----
From: Gregory Beat [SMTP:gregory.beat@mediaone.net]
Sent: Friday, August 29, 1997 10:51 PM
To: tacgps@tapr.org
Subject: [TACGPS:552] Re: Showtime problem

John K. Pringle wrote:

> I recently completed the TAC-2 project including installation of my
> GPS-20. Everything seems to be operating normally except when I try to
> run SHOWTIME I get the following error message: " Device I/O error in
> line 1 of module SHWTM33D at address 0B1F:0696" and the program halts.
> The 1 PPS beeps are OK and I think initialization at 4800 kbps is OK.
> I edited SHOWTIME.GPS and inserted correct LAT, LON and altitude. Can
> anyone tell me what causes this error and how to correct it?

Powered up the TAC-2 with my new antenna and have received a similiar error.

"Device I/O error in line 1 of module SHWTM33D at address 0A12:0AE6"

I run Showtime in a DOS window on my Windows 95 machine. Experimenting with a couple of
settings, it appears that Showtime does not like the behavior of the Win95 screen saver. I understand
that someone was woking with Tom for a Windows version of the Showtime code. I suggested Retsik
Software for Windows since they wrote the AccuSet 4.1 application and there are nice
features that could be adopted.

Meanwhile, I shut the Screen saver off.

Greg Beat
W9GB

Attachment converted: Power Mac:WINMAIL.DAT 5 (????/----) (0002491E)

September 1997

Original source file: tacgps.9709
Source: http://ftp.tapr.org/product_docs/TAC2/mail_archives/tacgps.9709

1. [TACGPS:556] Re: Showtime problem

From: gregory.beat@mediaone.net (Gregory Beat)
Date: Mon, 1 Sep 1997 08:51:42 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <340AC770.A878A540@mediaone.net>
Rendered body type: text/plain

Richard M. Hambly wrote:

> A Windows 95 version is coming!
>
> The ALPHA testing has begun on TAC32. It has some of Showtime's
> features,
> but many others haven't been written yet. It will eventually have all
> of
> Showtime's features and more.
>
> If anyone is desperate enough to want to test this and is willing to
> run
> the risks, send me an e-mail.
>
> Rick Hambly
> WB2TNL

I would not say desperate, but if you need Beta testing for the TAC32,
drop me
a line. I should have time over the next few weeks to run it through it
paces ....

G. Beat
W9GB

---

2. [TACGPS:557] TAC32

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Mon, 1 Sep 1997 09:36:50 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCB6C2.93F8D480.rick@cnssys.com>
Rendered body type: text/plain

Gregory,

It's not all that hard. You can load the software directly from
http://www.cnssys.com/tac32 There is no file downloading to do but you will
need to get a plug-in if you use Netscape. If you use Internet Explorer a
new ActiveX component will automatically be loaded the first time you point
at this page (watch status line at the bottom of the browser). These allow
InstallShield to run directly from your Web browser.

The software has only been tested with the Motorola receiver. Go to
Edit/Serial Port on the menu and select either MotBin or NMEA mode
(Motorola works with either one) and the COM port number. Then play with
the menu selections and Help. It is very early in the development cycle so
there will be frequent updates.

Current version is 1.02.

Rick
WB2TNL

-----Original Message-----
From: Gregory Beat [SMTP:gregory.beat@mediaone.net]
Sent: Monday, September 01, 1997 9:52 AM
To: tacgps@tapr.org
Subject: [TACGPS:556] Re: Showtime problem

Richard M. Hambly wrote:

> A Windows 95 version is coming!
>
> The ALPHA testing has begun on TAC32. It has some of Showtime's
> features,
> but many others haven't been written yet. It will eventually have all
> of

> Showtime's features and more.
>
> If anyone is desperate enough to want to test this and is willing to
> run
> the risks, send me an e-mail.
>
> Rick Hambly
> WB2TNL

I would not say desperate, but if you need Beta testing for the TAC32,
drop me
a line. I should have time over the next few weeks to run it through it
paces ....

G. Beat
W9GB

3. [TACGPS:558] TAC and Unix

From: "Henk Uijterwaal (RIPE-NCC)" <henk@ripe.net>
Date: Mon, 1 Sep 1997 11:23:48 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <Pine.SUN.3.95.970901181753.2479C-100000@ncc.ripe.net>
Rendered body type: text/plain

I have to write a version of the TAC program under Unix and need a
bit of help to get started. So, has anybody on this list tried to
use the TAC from Unix?

If it is connected to the com1 port, I guess that I can access it by
reading and writing to/from /dev/cua0 but what are the commands and data
formats? What do I have to send to it in order to initialize it and
get the position back?

Any help would be really appreciated. Thanks,

Henk

Henk Uijterwaal   Email: henk.uijterwaal@ripe.net
RIPE Network Coordination Centre   WWW: http://www.ripe.net/home/henk
Singel 258   Phone: +31.20.5354414
1016 AB Amsterdam   Fax: +31.20.5354445
The Netherlands   Home: +31.20.6651962

%DCL-E-NOCFFE, unable to locate coffee - keyboard input suspended.

4. [TACGPS:559] TAC32 -

From: gregory.beat@mediaone.net (Gregory Beat)
Date: Mon, 1 Sep 1997 13:39:07 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <340B07C1.2E881119@mediaone.net>
Rendered body type: text/plain

Richard,

Thank you for the web page reference for TAC32.
http://www.cnssys.com/tac32

I adjusted COM port config, restarted program and it took
right off (I also use the Motorola OnCore receiver).

Nice program. I see that you have graphic support (on right
hand side) for newer 12 channel receivers and sidereal time displayed.

Possible functions could extend to astronomical --
local sunrise/sunset times, moon phases, tides (for coastal users)
but as you said - later versions ......

I will "kick the tires" over the next couple of weeks and compile
my observations and suggestions.

Tnx. 73

G. Beat
W9GB

5. [TACGPS:560] RE: TAC32 -

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Mon, 1 Sep 1997 15:08:45 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCB6F0.65E2CD20.rick@cnssys.com>
Rendered body type: text/plain

Greg,

I am using the 12 channel Motorola receiver. Tom had reported a bug when
using the MotBin mode on 8 channel Motorola which I fixed but I haven't had
anyone to check it out yet.

It's never been checked out with any other brand of receiver, either. Due
to the contortions needed during setup to deal with bugs in the earlier
Motorola receivers there could easily be problems here. I hope to borrow a
Garmen some day for development and testing.

Lots of work to do yet but I am using this to manage the time on a critical
project for the Navy. Much better than buying a $2000 GPS board!

Rick
WB2TNL

-----Original Message-----
From: Gregory Beat [SMTP:gregory.beat@mediaone.net]
Sent: Monday, September 01, 1997 2:39 PM
To: tacgps@tapr.org
Subject: [TACGPS:559] TAC32 -

Richard,

Thank you for the web page reference for TAC32.
http://www.cnssys.com/tac32

I adjusted COM port config, restarted program and it took
right off (I also use the Motorola OnCore receiver).

Nice program. I see that you have graphic support (on right
hand side) for newer 12 channel receivers and sidereal time displayed.

Possible functions could extend to astronomical --
local sunrise/sunset times, moon phases, tides (for coastal users)
but as you said - later versions ......

I will "kick the tires" over the next couple of weeks and compile
my observations and suggestions.

Tnx. 73

G. Beat
W9GB

6. [TACGPS:561] RE: TAC32 -

From: Allen Schaeffer <ascha@erols.com>
Date: Mon, 1 Sep 1997 17:52:44 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <340B4711.1AD294CF@erols.com>
Rendered body type: text/plain

Just wanted to let you know I have tried TAC32 with my Garmin 20 based TAC. It
gives an initial time on startup, but does not update thereafter. I wonder
whether this is due to a 9600 baud rate which I have not been able to change
using the edit com port function. I would be interested in working with you on
TAC32 with my Garmin if I can be of help.

Richard M. Hambly wrote:

> Greg,
>
> I am using the 12 channel Motorola receiver. Tom had reported a bug when
> using the MotBin mode on 8 channel Motorola which I fixed but I haven't had
> anyone to check it out yet.
>
> It's never been checked out with any other brand of receiver, either. Due
> to the contortions needed during setup to deal with bugs in the earlier
> Motorola receivers there could easily be problems here. I hope to borrow a
> Garmen some day for development and testing.
>
> Lots of work to do yet but I am using this to manage the time on a critical
> project for the Navy. Much better than buying a $2000 GPS board!

>
> Rick
> WB2TNL
>
> -----Original Message-----
> From: Gregory Beat [SMTP:gregory.beat@mediaone.net]
> Sent: Monday, September 01, 1997 2:39 PM
> To: tacgps@tapr.org
> Subject: [TACGPS:559] TAC32 -
>
> Richard,
>
> Thank you for the web page reference for TAC32.
> http://www.cnssys.com/tac32
>
> I adjusted COM port config, restarted program and it took
> right off (I also use the Motorola OnCore receiver).
>
> Nice program. I see that you have graphic support (on right
> hand side) for newer 12 channel receivers and sidereal time displayed.
>
> Possible functions could extend to astronomical --
> local sunrise/sunset times, moon phases, tides (for coastal users)
> but as you said - later versions ......
>
> I will "kick the tires" over the next couple of weeks and compile
> my observations and suggestions.
>
> Tnx. 73
>
> G. Beat
> W9GB

7. [TACGPS:562] RE: TAC32 -

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Mon, 1 Sep 1997 18:05:42 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCB709.BE75A160.rick@cnssys.com>
Rendered body type: text/plain

Allen,

Yes, the data port setup parameters are fixed to the characteristics
defined by the Motorola boards. You say the Garmin is 9600 baud? Is it
fixed at this rate? If so I could add a NEMA style check for this in the
startup. Is it possible to send me a copy of the Garmin manual? There are
a lot of users out there with Garmin so I want to add Garmin support ASAP.

Rick
WB2TNL

-----Original Message-----
From: Allen Schaeffer [SMTP:ascha@erols.com]
Sent: Monday, September 01, 1997 6:53 PM
To: tacgps@tapr.org
Subject: [TACGPS:561] RE: TAC32 -

Just wanted to let you know I have tried TAC32 with my Garmin 20 based TAC.
 It
gives an initial time on startup, but does not update thereafter. I wonder
whether this is due to a 9600 baud rate which I have not been able to
change
using the edit com port function. I would be interested in working with
you on
TAC32 with my Garmin if I can be of help.

8. [TACGPS:563] Re: TAC and Unix

From: mdf@angoss.com (Matthew Francey)
Date: Mon, 1 Sep 1997 18:18:57 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199709012314.XAA12157@hydrogen>
Rendered body type: text/plain

>I have to write a version of the TAC program under Unix and need a
>bit of help to get started. So, has anybody on this list tried to
>use the TAC from Unix?

Yeah. I have an **extremely primitive** version of "showtime" running
on my Linux machine. It clears the screen, sends a few commands down,

and then starts displaying the date/time, ticking up every second.

Its almost a religious experience watching my local time-ticks
match WWV exactly. Very spooky. :-)

>If it is connected to the com1 port, I guess that I can access it by
>reading and writing to/from /dev/cua0 but what are the commands and data
>formats? What do I have to send to it in order to initialize it and
>get the position back?

How you get data out of the receiver is in your receiver's user
manual. I use the Oncore receiver, and deal with it directly in
the Motorola binary format [NMEA is a bit of a nuisance for me].

How you get access to the 1PPS though is system specific. As it
happens, Linux has a convenient ioctl() which will put the process into
a wait until the CD line is asserted. Ie, on the rising edge of the
1PPS.

My "showtime" pulls data from the receiver, tweaks it for the next
1PPS, updates the a display buffer in memory, waits for the 1PPS, then
flushes the updates to the screen, and repeats.

9. [TACGPS:564] RE: TAC32 -

From: Allen Schaeffer <ascha@erols.com>
Date: Mon, 1 Sep 1997 18:25:30 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <340B4D5A.B52833D5@erols.com>
Rendered body type: text/plain

Richard,

I have the manual sent to me with the Garmin 20 from TAPR. Although in the
documentation 9600 baud is possible, I think it is functioning at 4800 baud in
ShowTime. I would be happy to FAX the manual to you if you would like for me
to do so. Under the Edit function in TAC32 I cannot change anything except the
com port & data type. It appears that the setting is currently at 9600 baud.
Is there a way to change it to 4800?

-Allen

Richard M. Hambly wrote:

> Allen,
>
> Yes, the data port setup parameters are fixed to the characteristics
> defined by the Motorola boards. You say the Garmin is 9600 baud? Is it
> fixed at this rate? If so I could add a NEMA style check for this in the
> startup. Is it possible to send me a copy of the Garmin manual? There are
> a lot of users out there with Garmin so I want to add Garmin support ASAP.
>
> Rick
> WB2TNL
>
> -----Original Message-----
> From: Allen Schaeffer [SMTP:ascha@erols.com]
> Sent: Monday, September 01, 1997 6:53 PM
> To: tacgps@tapr.org
> Subject: [TACGPS:561] RE: TAC32 -
>
> Just wanted to let you know I have tried TAC32 with my Garmin 20 based TAC.
> It
> gives an initial time on startup, but does not update thereafter. I wonder
> whether this is due to a 9600 baud rate which I have not been able to
> change
> using the edit com port function. I would be interested in working with
> you on
> TAC32 with my Garmin if I can be of help.

10. [TACGPS:565] RE: TAC32 -

From: "Gordon T. Uber" <gordon@ubr.com>
Date: Mon, 1 Sep 1997 18:50:26 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <2.2.16.19970901163544.2ae75342@best.com>
Rendered body type: text/plain

Garmin GPS-20 Baud rate selection:

Field 10 of the $PGRMC message sets the NMEA baud rate:

1 = 1200, 2 = 2400, 3 = 4800, 4 = 9600

>From the Garmin GPS 20 Technical Specification, Rev D

Gordon Uber

At 18:05 97/09/01 -0500, you wrote:
>Allen,
>
>Yes, the data port setup parameters are fixed to the characteristics
>defined by the Motorola boards. You say the Garmin is 9600 baud? Is it
>fixed at this rate? If so I could add a NEMA style check for this in the
>startup. Is it possible to send me a copy of the Garmin manual? There are
>a lot of users out there with Garmin so I want to add Garmin support ASAP.
>
>Rick
>WB2TNL

--
| XII | Gordon T. Uber, 3790 El Camino Real, Suite 142
| XI | Palo Alto, CA 94306-3314, email: gordon@ubr.com
| X \   /| CLOCKS and TIME: http://www.ubr.com/clocks/
| IX   \ / | Reynen & Uber WebDesign: http://www.ubr.com/rey&ubr

11. [TACGPS:566] Oncore VP+

From: Bill Broadley <bill@math.ucdavis.edu>
Date: Mon, 1 Sep 1997 23:11:51 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199709020408.VAA14780@proto.math.ucdavis.edu>
Rendered body type: text/plain

I'm trying to communicate with an Oncore VP I just put together.

It's supposed to come up on Motorola's binary format. The way I understand
it is if I connect at 9600 baud, 8 bits, 1 stop bit, no parity and send
the string @@Cj)<CR><LF> (ID command) that I should get a response.

The checksum is for all characters after the "@@" and before the <CR><LF>
I believe.

C xor j =) I believe.

Does that sounds right to people?

I'm getting 5.01-5.09 V off the:
        Motorola Oncore VP Interface Board Kit by McKinney Technology

As instructed. I'm getting 5.01-5.09V on the socket on the Oncore Vp on pins
2 and 3 as I expect. I'm getting 10v's on pins 2-3 of the serial interface
as expected (i.e. the send/receive pins are connected right).

Any other ideas? Or ways to see if the GPS is alive with just an Ohm meter
and a known good serial port. (I've been talking to my modem to make
sure the cable etc is good.)

--
Bill Broadley   Bill@math.ucdavis.edu   UCD Math Sys-Admin
Linux is great.   http://math.ucdavis.edu/~bill   PGP-ok

12. [TACGPS:567] Re: Oncore VP+

From: "Doug McKinney" <buoy@mcktech.com>
Date: Tue, 2 Sep 1997 00:38:50 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199709020535.WAA03193@mail.redshift.com>
Rendered body type: text/plain

> From: Bill Broadley <bill@math.ucdavis.edu>
> To: tacgps@tapr.org
> Subject: [TACGPS:566] Oncore VP+
> Date: Monday, September 01, 1997 9:11 PM
>
>
> I'm trying to communicate with an Oncore VP I just put together.
>
> It's supposed to come up on Motorola's binary format. The way I
understand

> it is if I connect at 9600 baud, 8 bits, 1 stop bit, no parity and send
> the string @@Cj)<CR><LF> (ID command) that I should get a response.
>
> The checksum is for all characters after the "@@" and before the <CR><LF>
> I believe.
>
> C xor j =) I believe.
>
> Does that sounds right to people?
>
> I'm getting 5.01-5.09 V off the:
>   Motorola Oncore VP Interface Board Kit by McKinney Technology
>
> As instructed. I'm getting 5.01-5.09V on the socket on the Oncore Vp on
pins
> 2 and 3 as I expect. I'm getting 10v's on pins 2-3 of the serial
interface
> as expected (i.e. the send/receive pins are connected right).
>
> Any other ideas? Or ways to see if the GPS is alive with just an Ohm
meter
> and a known good serial port. (I've been talking to my modem to make
> sure the cable etc is good.)
>
>
> --
> Bill Broadley   Bill@math.ucdavis.edu   UCD Math
Sys-Admin
> Linux is great.   http://math.ucdavis.edu/~bill   PGP-ok
>
Bill, you are on an adventure. The VP ONCORE is easy to use with
Motorola's PC Controller software and using the ONCORE's user manual.
Using the GPS without them will prove difficult. The normal way to obtain
them is with the $1200 development kit, and as an OEM, I have used several
versions. One way to get the PC Controller software is to download the
software for Tom Clark's Total Accurate Clock (TAC). The software for the
ONCORE is GPS.BAT and the software under the DIR BIN. The next problem is
getting the PC Controller control commands. As you can see, there is a lot
of work that need to be done to make this process easy, and maybe someone
reading this has a better approach. I am working with Synergy Systems to
write and NMEA Tech Note on using the ONCORE in the NMEA mode and I am
trying the same thing you are doing, namely sending a command @@Ci*<CR><LF>
where *= checksum (this command is to set NMEA mode).
        I am reverse engineering the serial string by sending the PC Controller
commands to another PC using ProComm and a null modem. This way I get the
Checksum that the PC Controller sends and the value you are sending is
correct @@Cj*<CR><LF> is HEX 40 40 43 6A 29 0D 0A where the checksum 29h=)
ASCII.
Now, I have been working today only on trying to get my ONCORE to respond
with ProComm and not yet successful. I'll let you know when I am.
        Another point is that the ONCORE has factory defaults set and one of them
is the unit being in IDLE MODE (not navigating, which you may be in). This
means you need to command it to FIX MODE which is @@Arff*<CR><LF>. Well
until I can control the GPS with ProComm, I can't say what you really need
to command to the GPS. Point is, I have the PC Controller software and
know how to make the GPS work and I know how to make commands work using
embedded computers like ONSET TattleTail computers. I have not had a
requirement to use the ONCORE as naked as you and many other users are
doing. My project with Synergy Systems may find away to solve these
problems that the rest of you guys are having with the ONCORE.
        Well, back to ProComm. 73's Doug (408)663-4999

13. [TACGPS:568] RE: TAC32 -

From: Dave Martindale <davem@cs.ubc.ca>
Date: Tue, 2 Sep 1997 01:24:05 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <l03102000b0316e3165ff@[198.162.38.159]>
Rendered body type: text/plain

>Garmin GPS-20 Baud rate selection:
>
>Field 10 of the $PGRMC message sets the NMEA baud rate:
>1 = 1200, 2 = 2400, 3 = 4800, 4 = 9600
>
>>From the Garmin GPS 20 Technical Specification, Rev D

I think that's true if you've got one of the newer GPS 20SL boards,
where the baud rate is stored in non-voltatile memory of some sort.

For the older GPS 20 boards (note the lack of SL), the baud rate is
determined by the state of the two serial input pins at power up.
The default is 4800 with those pins left floating or at "idle" RS-232
voltages. To get anything else, you need to add some circuitry that
pulls one or both of the pins high during power up

        Dave

14. [TACGPS:569] Re: Oncore VP+

From: Bill Broadley <bill@math.ucdavis.edu>
Date: Tue, 2 Sep 1997 01:37:37 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199709020634.XAA16256@proto.math.ucdavis.edu>
Rendered body type: text/plain

Okay here's some little snipped I wrote to help, if anyone objects to
tiny source code snippets posted here please let me know.

```
/* MotOut.c     Written by bill@webannex.com 9/1/97
        prints the command line argument as legal Motorolla binary command
        in the form @@Command<Checksum><CR><LF>.

        Meant to be used as ./motout Cj > /dev/serial           */
#include <stdio.h>
main(int argc, char **argv)
{
        int cr,lf,len,i,checksum;
        len=strlen(argv[1]);
        checksum=0;
        for (i=0;i<len;i++)
                checksum ^= argv[1][i];
        cr=0x0d;
        lf=0x0a;
        printf ("@@%s%c%c%c",argv[1],checksum,cr,lf);                           }


And to parse the response:
/* dumpchar.c           written by bill@webannex.com 9/1/97
        Just dumps everything on stdin in hex and decimal, written
        to debug the output of a motorolla oncore GPS.  Meant
        to be used:     cat /dev/serial | ./dumpchar */
#include <stdio.h>
main ()
{
  char c;
  int d,ret;
  while (1)
    {
      ret=scanf ("%c", &c);
        d=(int)c;
        if (ret>0)
        { printf ("ret=%d hex= %02x decimal=%02d asc=%c\n", ret,d,d,d); }
    }
}
```

I've yet to get ANYTHING from the gps though 8-(

> Bill, you are on an adventure. The VP ONCORE is easy to use with

Looks like it, I didn't think it would be that hard, I have documentation
for the motorolla binary format, figured it would be easy to get the
GPS to say something. I'm not wondering if the gps will do anything before
I run the GPS disk that came with it. Unfortunately I don't have dos.

> Motorola's PC Controller software and using the ONCORE's user manual.
> Using the GPS without them will prove difficult. The normal way to obtain
> them is with the $1200 development kit, and as an OEM, I have used several

Youch.

> versions. One way to get the PC Controller software is to download the
> software for Tom Clark's Total Accurate Clock (TAC). The software for the
> ONCORE is GPS.BAT and the software under the DIR BIN. The next problem is
> getting the PC Controller control commands. As you can see, there is a lot
> of work that need to be done to make this process easy, and maybe someone
> reading this has a better approach. I am working with Synergy Systems to
> write and NMEA Tech Note on using the ONCORE in the NMEA mode and I am
> trying the same thing you are doing, namely sending a command @@Ci*<CR><LF>
> where *= checksum (this command is to set NMEA mode).

> I am reverse engineering the serial string by sending the PC Controller
> commands to another PC using ProComm and a null modem. This way I get the
> Checksum that the PC Controller sends and the value you are sending is
> correct @@Cj*<CR><LF> is HEX 40 40 43 6A 29 0D 0A where the checksum 29h=)
> ASCII.

Yeah I got the checksum figured out, see code above.

> Now, I have been working today only on trying to get my ONCORE to respond
> with ProComm and not yet successful. I'll let you know when I am.

Please do, once I get some kinda of response I'm relatively confident I
can write a decent driver for it. Plan to get position data out, as
well as time data to run a stratum-1.

> Another point is that the ONCORE has factory defaults set and one of them
> is the unit being in IDLE MODE (not navigating, which you may be in). This
> means you need to command it to FIX MODE which is @@Arff*<CR><LF>. Well

I'll try this... sigh nothing.

> until I can control the GPS with ProComm, I can't say what you really need
> to command to the GPS. Point is, I have the PC Controller software and
> know how to make the GPS work and I know how to make commands work using
> embedded computers like ONSET TattleTail computers. I have not had a
> requirement to use the ONCORE as naked as you and many other users are
> doing. My project with Synergy Systems may find away to solve these
> problems that the rest of you guys are having with the ONCORE.
> Well, back to ProComm. 73's Doug (408)663-4999

I'll keep ya posted, I'll keep sending commands to it blind... I'll
dig around to see if I can find someone with a dos box to let me play...

I just hope the damn thing's alive, was kinda shocked to find the board
shipped in a simple envelope. Also quite surprised to not get a full
manual with it. At least the motorola binary commands are covered. No
idea if the oncore VP is supposed to be functional without the dos
setup. It would have been nice to know ahead of time that dos was required
(if indeed it is).

--
Bill Broadley Bill@math.ucdavis.edu UCD Math Sys-Admin
Linux is great. http://math.ucdavis.edu/~bill PGP-ok

15. [TACGPS:570] Re: Oncore VP+

From: "Doug McKinney" <buoy@mcktech.com>
Date: Tue, 2 Sep 1997 02:00:13 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199709020659.XAA07451@mail.redshift.com>
Rendered body type: text/plain

> From: Bill Broadley <bill@math.ucdavis.edu>
> To: tacgps@tapr.org
> Subject: [TACGPS:566] Oncore VP+
> Date: Monday, September 01, 1997 9:11 PM
>
>
> I'm trying to communicate with an Oncore VP I just put together.
>
> It's supposed to come up on Motorola's binary format. The way I
understand
> it is if I connect at 9600 baud, 8 bits, 1 stop bit, no parity and send
> the string @@Cj)<CR><LF> (ID command) that I should get a response.
>
> The checksum is for all characters after the "@@" and before the <CR><LF>
> I believe.
>
> C xor j =) I believe.
>
> Does that sounds right to people?
>
> I'm getting 5.01-5.09 V off the:
> Motorola Oncore VP Interface Board Kit by McKinney Technology
>
> As instructed. I'm getting 5.01-5.09V on the socket on the Oncore Vp on
pins
> 2 and 3 as I expect. I'm getting 10v's on pins 2-3 of the serial
interface

> as expected (i.e. the send/receive pins are connected right).
>
> Any other ideas? Or ways to see if the GPS is alive with just an Ohm
meter
> and a known good serial port. (I've been talking to my modem to make
> sure the cable etc is good.)
>
>
> --
> Bill Broadley   Bill@math.ucdavis.edu   UCD Math
Sys-Admin
> Linux is great.   http://math.ucdavis.edu/~bill   PGP-ok
>
Good news, I found out how to communicate using ProComm and can control in
Motorola Proprietary Binary format and NMEA format. Iam doing more
testing, but for your case use ProComm in chat mode and type (with
instructions in {}) at 9600 8N1 type @@Cj{Alt and with numlock on
41}{enter}. The key is using the Alt and NumLock number pad. The NumLock
pad enteries are ASCII decimals of the Hex value i.e. the hex 29 for your
checksum is ASCII 41. Going to bed now and will continue more testing
tomorrow

16. [TACGPS:571] RE: TAC32 -

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Tue, 2 Sep 1997 06:02:55 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCB76D.51FBB560.rick@cnssys.com>
Rendered body type: text/plain

Allen,

TAC32 is setting itself to 9600 because it can't figure out what kind if
receiver it is so it is leaving the port in Motorola Binary configuration.
 I have a good idea of what to do to get the Garmin recognized so I'll get
on it ASAP.

The current V1.02 is broken anyway. It is setting the system clock wrong
by up to one second due to a line of test code I forgot to remove.

Rick

-----Original Message-----
From: Allen Schaeffer [SMTP:ascha@erols.com]
Sent: Monday, September 01, 1997 7:26 PM
To: tacgps@tapr.org
Subject: [TACGPS:564] RE: TAC32 -

Richard,

I have the manual sent to me with the Garmin 20 from TAPR. Although in the
documentation 9600 baud is possible, I think it is functioning at 4800 baud
in
ShowTime. I would be happy to FAX the manual to you if you would like for
me
to do so. Under the Edit function in TAC32 I cannot change anything except
the
com port & data type. It appears that the setting is currently at 9600
baud.
Is there a way to change it to 4800?

-Allen

Richard M. Hambly wrote:

> Allen,
>
> Yes, the data port setup parameters are fixed to the characteristics
> defined by the Motorola boards. You say the Garmin is 9600 baud? Is it
> fixed at this rate? If so I could add a NEMA style check for this in the
> startup. Is it possible to send me a copy of the Garmin manual? There
are
> a lot of users out there with Garmin so I want to add Garmin support
ASAP.
>
> Rick
> WB2TNL
>
> -----Original Message-----
> From: Allen Schaeffer [SMTP:ascha@erols.com]

> Sent: Monday, September 01, 1997 6:53 PM
> To: tacgps@tapr.org
> Subject: [TACGPS:561] RE: TAC32 -
>
> Just wanted to let you know I have tried TAC32 with my Garmin 20 based
TAC.
> It
> gives an initial time on startup, but does not update thereafter. I
wonder
> whether this is due to a 9600 baud rate which I have not been able to
> change
> using the edit com port function. I would be interested in working with
> you on
> TAC32 with my Garmin if I can be of help.

17. [TACGPS:572] Re: Oncore VP+

From: "Henk Uijterwaal (RIPE-NCC)" <henk@ripe.net>
Date: Tue, 2 Sep 1997 07:13:14 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <Pine.SUN.3.95.970902135426.5808B-100000@ncc.ripe.net>
Rendered body type: text/plain

On Tue, 2 Sep 1997, Bill Broadley wrote:

>
> Okay here's some little snipped I wrote to help, if anyone objects to
> tiny source code snippets posted here please let me know.

Well, I just tried dumpchar.c and it doesn't seem to work. It just sits
there waiting and waiting.... When I remove the "if(ret>0)", I get
lines and lines of "ret=-1 hex=...", e.g. no characters read. This
happens on both BSDI and Linux machines.

This is not a problem with the TAC. Showtime works fine and when I
connect to the unit with kermit, I get something back. (BTW, Bill,
this is something you might want to try:

```
  kermit -l /dev/serial
  kermit>connect
```

returns a string every second. The string is unreadable though as
Kermit interprets it as readable ASCII, but at least you see if
your unit is sending something).

I'm now going to look into the kermit source to see what kermit
does different from a simple "cat /dev/serial".

Henk


```
--------------------------------------------------------------------------------
Henk Uijterwaal                    Email: henk.uijterwaal@ripe.net
RIPE Network Coordination Centre     WWW: http://www.ripe.net/home/henk
Singel 258                         Phone: +31.20.5354414
1016 AB Amsterdam                    Fax: +31.20.5354445
The Netherlands                     Home: +31.20.6651962
--------------------------------------------------------------------------------
```


%DCL-E-NOCFFE, unable to locate coffee - keyboard input suspended.

18. [TACGPS:573] RE: TAC32 -

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Tue, 2 Sep 1997 09:37:19 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCB78B.78E2D500.rick@cnssys.com>
Rendered body type: text/plain

Allen,

The clock error has been fixed. If you want your clock set correctly I
recommend you re-install using the same process you used before (via
http://www.cnssys.com/tac32). No need to uninstall first.

Rick
WB2TNL

-----Original Message-----
From: Richard M. Hambly [SMTP:rick@cnssys.com]
Sent: Tuesday, September 02, 1997 6:56 AM
To: 'tacgps@tapr.org'

Subject: RE: [TACGPS:564] RE: TAC32 -

Allen,

TAC32 is setting itself to 9600 because it can't figure out what kind if
receiver it is so it is leaving the port in Motorola Binary configuration.
 I have a good idea of what to do to get the Garmin recognized so I'll get
on it ASAP.

The current V1.02 is broken anyway. It is setting the system clock wrong
by up to one second due to a line of test code I forgot to remove.

Rick

-----Original Message-----
From: Allen Schaeffer [SMTP:ascha@erols.com]
Sent: Monday, September 01, 1997 7:26 PM
To: tacgps@tapr.org
Subject: [TACGPS:564] RE: TAC32 -

Richard,

I have the manual sent to me with the Garmin 20 from TAPR. Although in the
documentation 9600 baud is possible, I think it is functioning at 4800 baud
in
ShowTime. I would be happy to FAX the manual to you if you would like for
me
to do so. Under the Edit function in TAC32 I cannot change anything except
the
com port & data type. It appears that the setting is currently at 9600
baud.
Is there a way to change it to 4800?

-Allen

Richard M. Hambly wrote:

> Allen,
>
> Yes, the data port setup parameters are fixed to the characteristics
> defined by the Motorola boards. You say the Garmin is 9600 baud? Is it
> fixed at this rate? If so I could add a NEMA style check for this in the
> startup. Is it possible to send me a copy of the Garmin manual? There
are
> a lot of users out there with Garmin so I want to add Garmin support
ASAP.
>
> Rick
> WB2TNL
>
> -----Original Message-----
> From: Allen Schaeffer [SMTP:ascha@erols.com]
> Sent: Monday, September 01, 1997 6:53 PM
> To: tacgps@tapr.org
> Subject: [TACGPS:561] RE: TAC32 -
>
> Just wanted to let you know I have tried TAC32 with my Garmin 20 based
TAC.
> It
> gives an initial time on startup, but does not update thereafter. I
wonder
> whether this is due to a 9600 baud rate which I have not been able to
> change
> using the edit com port function. I would be interested in working with
> you on
> TAC32 with my Garmin if I can be of help.

19. [TACGPS:574] Re: TAC and Unix

From: "Henk Uijterwaal (RIPE-NCC)" <henk@ripe.net>
Date: Tue, 2 Sep 1997 09:44:31 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <Pine.SUN.3.95.970902163340.16079B-100000@ncc.ripe.net>
Rendered body type: text/plain

On Mon, 1 Sep 1997, Matthew Francey wrote:

> >I have to write a version of the TAC program under Unix and need a
> >bit of help to get started. So, has anybody on this list tried to
> >use the TAC from Unix?

>
> Yeah. I have an **extremely primitive** version of "showtime" running
> on my Linux machine. It clears the screen, sends a few commands down,
> and then starts displaying the date/time, ticking up every second.

Well, yes but how do I get it to talk to me. I started with the obvious
piece of code:

```
        int main () {
                int x;
                char buf[BUFSIZ];

                x = open ("/dev/tty00", O_RDONLY, 0);

                while (1==1) {
                        read (x, buf, BUFSIZ);
                        printf ("Read: %s\n ", buf);
                }
                return 0;
        }
```

This does open the device but I never see anything arrive in buffer.
The same happens when I read character by character, or fopen the file,
or something like that.

I must be doing something stupid here but what?

I *know* that something is coming out of my TAC, when I connect to
it with Kermit, I see messages arriving every second.   I looked at
the Kermit source (which is an interesting exercise in itself) but
cannot find anything special there when the device is opened.

And, yes, I also tried to run this as root, in order to exclude
problems with priviledges.

Henk


```
--------------------------------------------------------------------------------
Henk Uijterwaal                    Email: henk.uijterwaal@ripe.net
RIPE Network Coordination Centre     WWW: http://www.ripe.net/home/henk
Singel 258                         Phone: +31.20.5354414
1016 AB Amsterdam                    Fax: +31.20.5354445
The Netherlands                     Home: +31.20.6651962
--------------------------------------------------------------------------------
```


%DCL-E-NOCFFE, unable to locate coffee - keyboard input suspended.

20. [TACGPS:575] Re: TAC and Unix

From: Dave Martindale <davem@cs.ubc.ca>
Date: Tue, 2 Sep 1997 11:06:58 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <l03102000b031f4e50ab2@[198.162.38.159]>
Rendered body type: text/plain

>This does open the device but I never see anything arrive in buffer.
>The same happens when I read character by character, or fopen the file,
>or something like that.
>
>I must be doing something stupid here but what?

Unix serial ports acquire a whole bunch of default characteristics when
you first open them. At least some of them are almost certainly wrong
for your application. You need to do an ioctl() call to set up
the baud rate and other character processing options (flow control,
wakeup on every character or end of line, etc).

Try doing a "man termio" to see what all the options are. As an example,
here is a piece of code used to configure a Unix serial port to talk
to a pen plotter. It probably is *not* correct for the TAC, but might
get you started:

        Dave

```
static struct termio    term = {
        ISTRIP | IXON | ICRNL,          /* c_iflag */
        0,                              /* c_oflag */
        B9600 | CS8 | CREAD | CLOCAL,   /* c_cflag */
        ICANON,                         /* c_lflag */
```

```
        0,                              /* c_line */
        { 0 },                          /* c_cc */
};


static int
hp_init_plot()
{

        if ((dev = open(devname, O_RDONLY, 0)) < 0) {
                perror(devname);
                return FALSE;
        }
       (void) ioctl(dev, TCSETAF, &term);
        return TRUE;
}
```

21. [TACGPS:576] RE: TAC32 -

From: clark@tomcat.gsfc.nasa.gov
Date: Tue, 2 Sep 1997 13:25:23 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <35952@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

I'm on the far end of a slow telnet connection in Brazuil, so pardon any thyping problems!

For the >>GARMIN<< the receiver is assumed to be at 4800 only. For the Motorola, SHOWTIME dynamically changes the connections between 4800 (for the NMEA msgs) and 9600 (for Motorola proprietary binary). SHOWTIME has some limited "smarts" to be able to tell the difference between the two very different breeds of rcvrs, but it is UNCONDITIONALLY switched with the *.gps file parameter APTYPE (1-4 for Moto, 5 for Garmin). This is shown in the sample *.gps fil;es I provided, and is documented in the documentation files (somewhere). Since I am in a remote location, I can't give more details.

Normally I could have answered your questions since all the software, docum,ent'n etc are on my laptop. Unfortunately, while checking into a hotel down here, my laptop and digital camera were stolen and I have little hope of getting them back ;<{

I'll be back home in a couple of days when I can answer your questions in more details.

For the folks having W95 problems with SHOWTIME, try going to the SYSTEM icon in the CONRTOL PANEL. Go to the COM1 or COM2 port u are using and diable (sorry disable) the 16550 FIFO buffer. This will make the serial port look like a 16450 and MAY solve your problems.

73, Tom

22. [TACGPS:577] 2 GPS-20/GPS-30 Questions

From: "Eric Rosenberg" <erosenberg@orbcomm.net>
Date: Tue, 2 Sep 1997 17:31:33 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <9708028732.AA873250425@smtp_link.orbcomm.net>
Rendered body type: text/plain

I'm purchasing the GPS-30PC in lieu of the GPS-20 for my TAC-2 (I'm still waiting for it, too)..

Some questions come to mind:

1. It appears that the Power Trends 5100 is the power supply to get. Which one...vertical, horizontal, with or without tabs?

2. The GPS-20 comes from TAPR with an internal battery. How does one install one in the (now emasculated) GPS-30PC? Are there docs on this?

3. I'll need to put an antenna connector on the unit. Is the MCX the way to go, or is there a better choice?

4. I've heard that there is an add-on kit for a local display option of the TAC. Is this true?

Thanks,

Eric
erosenberg@orbcomm.net

23. [TACGPS:578] RE: TAC32 -

From: Allen Schaeffer <ascha@erols.com>
Date: Tue, 2 Sep 1997 18:36:42 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <340CA25D.2722DB23@erols.com>
Rendered body type: text/plain

Richard,

Just downloaded TAC32 again - it still only displays the startup time without
further update. It still seems to be setting itself to 9600 baud. I checked
the Garmin 20 output with another display program - it is 4800 baud.

Allen

Richard M. Hambly wrote:

> Allen,
>
> The clock error has been fixed. If you want your clock set correctly I
> recommend you re-install using the same process you used before (via
> http://www.cnssys.com/tac32). No need to uninstall first.
>
> Rick
> WB2TNL
>
> -----Original Message-----
> From: Richard M. Hambly [SMTP:rick@cnssys.com]
> Sent: Tuesday, September 02, 1997 6:56 AM
> To: 'tacgps@tapr.org'
> Subject: RE: [TACGPS:564] RE: TAC32 -
>
> Allen,
>
> TAC32 is setting itself to 9600 because it can't figure out what kind if
> receiver it is so it is leaving the port in Motorola Binary configuration.
> I have a good idea of what to do to get the Garmin recognized so I'll get
> on it ASAP.
>
> The current V1.02 is broken anyway. It is setting the system clock wrong
> by up to one second due to a line of test code I forgot to remove.
>
> Rick
>
> -----Original Message-----
> From: Allen Schaeffer [SMTP:ascha@erols.com]
> Sent: Monday, September 01, 1997 7:26 PM
> To: tacgps@tapr.org
> Subject: [TACGPS:564] RE: TAC32 -
>
> Richard,
>
> I have the manual sent to me with the Garmin 20 from TAPR. Although in the
> documentation 9600 baud is possible, I think it is functioning at 4800 baud
> in
> ShowTime. I would be happy to FAX the manual to you if you would like for
> me
> to do so. Under the Edit function in TAC32 I cannot change anything except
> the
> com port & data type. It appears that the setting is currently at 9600
> baud.
> Is there a way to change it to 4800?
>
> -Allen
>
> Richard M. Hambly wrote:
>
> > Allen,
> >
> > Yes, the data port setup parameters are fixed to the characteristics
> > defined by the Motorola boards. You say the Garmin is 9600 baud? Is it
> > fixed at this rate? If so I could add a NEMA style check for this in the
> > startup. Is it possible to send me a copy of the Garmin manual? There
> are
> > a lot of users out there with Garmin so I want to add Garmin support
> ASAP.
> >
> > Rick

> > WB2TNL
> >
> > -----Original Message-----
> > From: Allen Schaeffer [SMTP:ascha@erols.com]
> > Sent: Monday, September 01, 1997 6:53 PM
> > To: tacgps@tapr.org
> > Subject: [TACGPS:561] RE: TAC32 -
> >
> > Just wanted to let you know I have tried TAC32 with my Garmin 20 based
> TAC.
> > It
> > gives an initial time on startup, but does not update thereafter. I
> wonder
> > whether this is due to a 9600 baud rate which I have not been able to
> > change
> > using the edit com port function. I would be interested in working with
> > you on
> > TAC32 with my Garmin if I can be of help.

24. [TACGPS:579] Re: 2 GPS-20/GPS-30 Questions

From: Dave Martindale <davem@cs.ubc.ca>
Date: Tue, 2 Sep 1997 19:05:55 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <l03102000b032655e775d@[198.162.38.159]>
Rendered body type: text/plain

>2. The GPS-20 comes from TAPR with an internal battery. How does one
>install one in the (now emasculated) GPS-30PC? Are there docs on this?

If the 30 is the same board as the 20, there is a standby power pin on the board connector. It's pin 7, and needs to be 4 to 33 VDC at 50 uA. You might also be able to find the appropriate lithium battery and solder it directly to the board, but it's probably easier to use the connector.

>3. I'll need to put an antenna connector on the unit. Is the MCX the way
>to go, or is there a better choice?

The 20 comes with a surface-mount MCX female, so you know that that will fit. But if you're going to mount the thing inside a box anyway, and use another antenna connector on the box (probably a BNC), then it would probably work to just solder a piece of thin 50-ohm coax like RG-174 directly to the GPS board and to the BNC jack mounted on the box.

Yes, this is likely to produce more of an impedance discontinuity than an MCX male and female properly installed on the cable and GPS board. But I'll bet it works pretty well anyway.

        Dave

Note: I have a 20, not a 30, so I'm guessing at some of these answers.

25. [TACGPS:580] RE: TAC32 -

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Tue, 2 Sep 1997 19:06:07 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCB7DB.187876C0.rick@cnssys.com>
Rendered body type: text/plain

Allen,

Sorry, that message was meant for Greg Beat - he has a Motorola receiver.
  Sorry to waste your time on that one.

I have a good handle on the Garmin issue, I just need a little time to code the solution. It is now the top priority. I will be changing the serial port dialog box to allow for more selections such as "Search for a GPS receiver" and fixed modes for "Motorola Binary", Motorola NMEA" and "Garmin NMEA". I will also allow setting the baud rate so we can operate these units at their fastest allowable rates which will make the display more responsive. All selections in TAC32 are saved between sessions (even the placement on the screen). This will speed up the initialization of the program and make it more reliable.

Just as it was difficult to design the hardware to accommodate all the receivers, so it is difficult to design the software to do the same. For example, it is not enough to say you want the Garmin to work at 9600 baud - the software has to magically discover what baud rate the receiver is set to and then issue the change baud rate command to the receiver before changing the computer's baud rate. Not really all that hard to do, just

takes time.

Rick
WB2TNL

-----Original Message-----
From: Allen Schaeffer [SMTP:ascha@erols.com]
Sent: Tuesday, September 02, 1997 7:37 PM
To: tacgps@tapr.org
Subject: [TACGPS:578] RE: TAC32 -

Richard,

Just downloaded TAC32 again - it still only displays the startup time
without
further update. It still seems to be setting itself to 9600 baud. I
checked
the Garmin 20 output with another display program - it is 4800 baud.

Allen

Richard M. Hambly wrote:

> Allen,
>
> The clock error has been fixed. If you want your clock set correctly I
> recommend you re-install using the same process you used before (via
> http://www.cnssys.com/tac32). No need to uninstall first.
>
> Rick
> WB2TNL
>
> -----Original Message-----
> From: Richard M. Hambly [SMTP:rick@cnssys.com]
> Sent: Tuesday, September 02, 1997 6:56 AM
> To: 'tacgps@tapr.org'
> Subject: RE: [TACGPS:564] RE: TAC32 -
>
> Allen,
>
> TAC32 is setting itself to 9600 because it can't figure out what kind if
> receiver it is so it is leaving the port in Motorola Binary
configuration.
> I have a good idea of what to do to get the Garmin recognized so I'll
get
> on it ASAP.
>
> The current V1.02 is broken anyway. It is setting the system clock wrong
> by up to one second due to a line of test code I forgot to remove.
>
> Rick
>
> -----Original Message-----
> From: Allen Schaeffer [SMTP:ascha@erols.com]
> Sent: Monday, September 01, 1997 7:26 PM
> To: tacgps@tapr.org
> Subject: [TACGPS:564] RE: TAC32 -
>
> Richard,
>
> I have the manual sent to me with the Garmin 20 from TAPR. Although in
the
> documentation 9600 baud is possible, I think it is functioning at 4800
baud
> in
> ShowTime. I would be happy to FAX the manual to you if you would like
for
> me
> to do so. Under the Edit function in TAC32 I cannot change anything
except
> the
> com port & data type. It appears that the setting is currently at 9600
> baud.
> Is there a way to change it to 4800?
>
> -Allen
>
> Richard M. Hambly wrote:
>

> > Allen,
> >
> > Yes, the data port setup parameters are fixed to the characteristics
> > defined by the Motorola boards. You say the Garmin is 9600 baud? Is
it
> > fixed at this rate? If so I could add a NEMA style check for this in
the
> > startup. Is it possible to send me a copy of the Garmin manual? There
> are
> > a lot of users out there with Garmin so I want to add Garmin support
> ASAP.
> >
> > Rick
> > WB2TNL
> >
> > -----Original Message-----
> > From: Allen Schaeffer [SMTP:ascha@erols.com]
> > Sent: Monday, September 01, 1997 6:53 PM
> > To: tacgps@tapr.org
> > Subject: [TACGPS:561] RE: TAC32 -
> >
> > Just wanted to let you know I have tried TAC32 with my Garmin 20 based
> TAC.
> > It
> > gives an initial time on startup, but does not update thereafter. I
> wonder
> > whether this is due to a 9600 baud rate which I have not been able to
> > change
> > using the edit com port function. I would be interested in working
with
> > you on
> > TAC32 with my Garmin if I can be of help.

26. [TACGPS:581] RE: TAC32 - Further revisions

From: gregory.beat@mediaone.net (Gregory Beat)
Date: Tue, 2 Sep 1997 20:59:18 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <340CC1E0.B27DFF70@mediaone.net>
Rendered body type: text/plain

Richard M. Hambly wrote:

> I have a good handle on the Garmin issue, I just need a little time to
> code
> the solution. It is now the top priority. I will be changing the
> serial
> port dialog box to allow for more selections such as "Search for a GPS
>
> receiver" and fixed modes for "Motorola Binary", Motorola NMEA" and
> "Garmin
> NMEA".

I did install your new version. First, always remember to close the
TAC-32 programthat is running when you perform Install fromthe Web.
Nice error message, but you
do have to start over again.

When I started program, the clock appears but not SNR graph or
satellite IDs. I checks the "Set the serial port" and noted the program

did not default to either NMEA or Motorola - the selection was "null" or
blank.

Closed program and restarted and running as before (although I did not
pay attention
to the second timing differential in the ewarlier version)

> I will also allow setting the baud rate so we can operate these
> units at their fastest allowable rates which will make the display
> more
> responsive. All selections in TAC32 are saved between sessions (even
> the
> placement on the screen). This will speed up the initialization of the
>
> program and make it more reliable.

Great idea .....

> Just as it was difficult to design the hardware to accommodate all the

>
> receivers, so it is difficult to design the software to do the same.
> For
> example, it is not enough to say you want the Garmin to work at 9600
> baud -
> the software has to magically discover what baud rate the receiver is
> set
> to and then issue the change baud rate command to the receiver before
> changing the computer's baud rate. Not really all that hard to do,
> just
> takes time.

As an FYI, I am running the Oncore VP (8 channel) receiverSoftware
version & Rev # 8
Software date: August 6, 1996
Option IB

Nice to see the tacgps group so busy ......

G. Beat
W9GB

27. [TACGPS:582] Re: 2 GPS-20/GPS-30 Questions

From: "Ronald G. Parsons" <w5rkn@amsat.org>
Date: Tue, 2 Sep 1997 21:48:38 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <340CCF76.C9897296@amsat.org>
Rendered body type: text/plain

Eric Rosenberg wrote:
..
>
> 2. The GPS-20 comes from TAPR with an internal battery. How does one
> install one in the (now emasculated) GPS-30PC? Are there docs on this?
..

Did you find a good way to emasculate the GPS-30PC? Did you find a bad way?

--
Ron W5RKN

also:
rparsons@bga.com

28. [TACGPS:583] Re: TAC and Unix

From: "Henk Uijterwaal (RIPE-NCC)" <henk@ripe.net>
Date: Wed, 3 Sep 1997 10:33:16 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <Pine.SUN.3.95.970903172647.20365C-100000@ncc.ripe.net>
Rendered body type: text/plain

On Tue, 2 Sep 1997, Dave Martindale wrote:

> >This does open the device but I never see anything arrive in buffer.
> >The same happens when I read character by character, or fopen the file,
> >or something like that.
> >
> >I must be doing something stupid here but what?
>
> Unix serial ports acquire a whole bunch of default characteristics when
> you first open them. At least some of them are almost certainly wrong
> for your application. You need to do an ioctl() call to set up
> the baud rate and other character processing options (flow control,
> wakeup on every character or end of line, etc).

This helped, sort-of. When I do a tcsetattr, I can adjust the parameters
and read the new ones back with tcgetattr.... BUT

> Try doing a "man termio" to see what all the options are. As an example,
> here is a piece of code used to configure a Unix serial port to talk
> to a pen plotter. It probably is *not* correct for the TAC, but might
> get you started:

which ones do I need. man termio gives me tons of options. So far,
I've been using:

```
  c_iflag = IGNPAR | ICRNL;
```

```
  c_oflag = 0
  c_cflag = CS8 | CREAD
  c_lflag = ICANON

When I then send my TAC a "receiver id string" (@@Cj(<cr><lf), it returns
120 bytes where I expect 249, starting with "@@Cj<cr><lf>COPY".  So I
guess that I still have a bit set wrong, does anybody know what the
correct values are?

Henk

--------------------------------------------------------------------------------
Henk Uijterwaal                    Email: henk.uijterwaal@ripe.net
RIPE Network Coordination Centre     WWW: http://www.ripe.net/home/henk
Singel 258                         Phone: +31.20.5354414
1016 AB Amsterdam                    Fax: +31.20.5354445
The Netherlands                     Home: +31.20.6651962
--------------------------------------------------------------------------------

%DCL-E-NOCFFE, unable to locate coffee - keyboard input suspended.
```

29. [TACGPS:584] Re: TAC and Unix

```
From: Lyndon Nerenberg <lyndon@ve7tcp.ampr.org>
Date: Wed, 3 Sep 1997 11:34:55 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199709031629.KAA07637@ve7tcp.ampr.org>
Rendered body type: text/plain

You need to add (at least) CLOCAL, otherwise the open blocks waiting for
CD to assert. You'll also have to disable RTS/CTS flow control:

        c_cflag &= ~(CCTS_OFLOW|CRTS_IFLOW)

What you really want to do is put the port into raw mode, otherwise
the tty driver can muck things up by interpreting some of the
characters, and doing end-of-line canonicalizations.

--lyndon
```

30. [TACGPS:585] Re: TAC and Unix

```
From: Dave Martindale <davem@cs.ubc.ca>
Date: Thu, 4 Sep 1997 00:41:29 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <l03102000b0340541cd10@[198.162.38.159]>
Rendered body type: text/plain

>which ones do I need.  man termio gives me tons of options.  So far,
>I've been using:
>
>
>  c_iflag = IGNPAR | ICRNL;
>  c_oflag = 0
>  c_cflag = CS8 | CREAD
>  c_lflag = ICANON

You probably don't want ICANON - that tells UNIX to treat some characters
as input editing (backspace/rubout, backslash, line delete, etc).
And somewhere in there you have to tell the device what bit rate you
need, so there should be a B4800 or B9600 somewhere.

Putting the port into RAW mode, as Lyndon suggests, is one option.
The advantage is that you get every character as it arrives without
regard to what it is.  The downside is that on a reasonably fast
machine, your "read" calls will always return just one character, and
you'll end up doing one system call per character.  It is more efficient
to have UNIX collect the characters until it sees the CR/LF that terminates
each line of NMEA data, and then pass back the entire line at one time.
It *is* possible to get most UNIX terminal drivers to pass back whole
lines, while at the same time not doing any other character processing.
But I no longer remember exactly the collection of bits to set to
get this effect.

Whenever I need to do something like this, I just do a "man termio",
read the description of each bit, decide whether I need each bit
set or clear (or it doesn't matter), set up code to do that, and I'm
done.  Reading through the descriptions is tedious, but it only needs
to be done once.

        Dave
```

31. [TACGPS:586] Re: TAC and Unix

From: "Henk Uijterwaal (RIPE-NCC)" <henk@ripe.net>
Date: Thu, 4 Sep 1997 07:40:41 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <Pine.SUN.3.95.970904140826.18955A-100000@ncc.ripe.net>
Rendered body type: text/plain

Thanks to everybody who replied....

> >which ones do I need. man termio gives me tons of options. So far,
> >I've been using:
> >
> >
> > c_iflag = IGNPAR | ICRNL;
> > c_oflag = 0
> > c_cflag = CS8 | CREAD
> > c_lflag = ICANON
>
> You probably don't want ICANON - that tells UNIX to treat some characters
> as input editing (backspace/rubout, backslash, line delete, etc).
> And somewhere in there you have to tell the device what bit rate you
> need, so there should be a B4800 or B9600 somewhere.

I took ICANON out and added a CLOCAL plus a ~(CCTS_OFLOW|CRTS_IFLOW).
(as Lyndon suggested). I was using c_ispeed/c_ospeed to set the
speed to 9600. Finally, before setting any bits in c_?flag, I set
the words to 0, in order to disable all other bits. I can then
set and read the config with tcsetattr/tcgetattr.

Finally, I set the c_cc[i] bits to 0, except for VMIN (block input until
>1 character read).

I then send the Motorola the string "@@Cj<checksum><cr><lf> and start
reading from the input, byte by byte.

At least I now get something back. The program sees burst of bytes,
paused for approximately a second, sees another burst of bytes, pauses
and so on.   So, it looks as if I now see something related to the
output buffer.

BUT, if I print the characters that I read, they don't seem to make any
sense.   I'd expect to see at least two "@@" somewhere but nothing
like that.

> Whenever I need to do something like this, I just do a "man termio",
> read the description of each bit, decide whether I need each bit
> set or clear (or it doesn't matter), set up code to do that, and I'm
> done. Reading through the descriptions is tedious, but it only needs
> to be done once.

I did that, and yes, it is tedious but as this IS the first time
that I'm using termio, and the man page plus the books that I have
are good at explaining what the options do, but not why you need
them or not.

Henk

ps. If anybody has a piece of working code that he/she is willing
to share, let me know.

Henk Uijterwaal   Email: henk.uijterwaal@ripe.net
RIPE Network Coordination Centre   WWW: http://www.ripe.net/home/henk
Singel 258   Phone: +31.20.5354414
1016 AB Amsterdam   Fax: +31.20.5354445
The Netherlands   Home: +31.20.6651962

%DCL-E-NOCFFE, unable to locate coffee - keyboard input suspended.

32. [TACGPS:587] Oncore VP+Unix

From: Bill Broadley <bill@math.ucdavis.edu>
Date: Thu, 4 Sep 1997 10:14:34 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199709041513.IAA01785@proto.math.ucdavis.edu>

Rendered body type: text/plain

Hello all,

Got the Oncore working by using a friends dos box to get it all setup.
I'm using the Interface Board Kit by McKinney Technology to connect
via a db-9.

I'll append the code I used to display the 1 second pulses (sorry it's
just motorola binary format raw). Anyone know of some documentation
for the format? the stuff I got with TAPR's kit is very lacking. Frustrating
to have a reference to a command description, but it wasn't included 8-(

Unfortunately I was playing around with ioformat trying to get it
into NMEA mode so I can setup a stratum 1 time server. The unfortunate
part is somehow I got it into one of the other modes and
now it's completely quiet. Anyone know the command to get into NMEA mode?

Anyone know the NMEA command to send position every second or
similiar? (I might have succeeded in switching to NMEA but now
it's not automatically sending updates when I connect at 4800).

Anyone know the Loran command to send a position? (I might have
suceeded in switching to Loran but now it's not automatically
sending updates when I connect at 1200).

I'm very encourage though to get a position fix, track satalites
etc with the dos software. Now to get similiar for linux.

```
/* Just cats the port the GPS is on, and prints escape codes for
the unprintables.  Bill Broadley bill@webannex.com 9/4/97 */
#include <termio.h>
#include <sys/types.h>
#include <sys/stat.h>
#include <fcntl.h>
#define FALSE   0
#define TRUE    1
static struct termio term =
{
  ISTRIP | IXON | ICRNL,        /* c_iflag */
  0,                            /* c_oflag */
  B9600 | CS8 | CREAD | CLOCAL, /* c_cflag */
  ICANON,                       /* c_lflag */
  0,                            /* c_line */
  {0},                          /* c_cc */
};

main ()
{
  int dev, ret, d, line;
  char c;
  char *buf;
  if ((dev = open ("/dev/ttyS0", O_RDONLY, 0)) < 0)
    {
      perror ("/dev/ttyS0");
      return FALSE;
    }
  printf ("dev=%d\n", dev);
  (void) ioctl (dev, TCSETAF, &term);
  while (1)
    {
      ret = read (dev, &c, 1);
      d = (int) c;
      if (ret > 0)
        {
          if (d == 10)
            { line++; }
          else
            {
              if ((d < 32) || (d > 127))
                { printf ("\\%02x", d); }
              else
                { printf ("%c", c); }
            }
        }
    }
  return TRUE;
}
```

```
--
Bill Broadley           Bill@math.ucdavis.edu              UCD Math Sys-Admin
Linux is great.         http://math.ucdavis.edu/~bill                  PGP-ok
```

33. [TACGPS:588] Re: Oncore VP+Unix

From: "Doug McKinney" <buoy@mcktech.com>
Date: Thu, 4 Sep 1997 13:18:14 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199709041802.LAA09195@mail.redshift.com>
Rendered body type: multipart/mixed

[No readable text body. See the preserved original monthly archive.]
[Inline non-text content: multipart/mixed; 3,695 bytes]

34. [TACGPS:589] Re: TAC and Unix

From: Lyndon Nerenberg <lyndon@ve7tcp.ampr.org>
Date: Thu, 4 Sep 1997 13:43:42 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199709041838.MAA15938@ve7tcp.ampr.org>
Rendered body type: text/plain

>>>>> "Dave" == Dave Martindale <davem@cs.ubc.ca> writes:

```
    Dave> Putting the port into RAW mode, as Lyndon suggests, is one
    Dave> option.  The advantage is that you get every character as it
    Dave> arrives without regard to what it is.  The downside is that
    Dave> on a reasonably fast machine, your "read" calls will always
    Dave> return just one character, and you'll end up doing one
    Dave> system call per character.  It is more efficient to have
    Dave> UNIX collect the characters until it sees the CR/LF that
    Dave> terminates each line of NMEA data, and then pass back the
    Dave> entire line at one time.  It *is* possible to get most UNIX
    Dave> terminal drivers to pass back whole lines, while at the same
    Dave> time not doing any other character processing.  But I no
    Dave> longer remember exactly the collection of bits to set to get
    Dave> this effect.

Me either (although I know way too much about setsockopt() these days :-)

In the Olde Days(tm) we used VMIN in conjunction with raw mode in the
tty driver. When VMIN != 0 it told the tty driver to delay returning
data for up to VMIN tenths (?) of a second as long as data continued
to arrive. Thus if you were getting a burst of input data, the driver
would buffer multiple characters and return them in a bunch from the
read() call. This mandatory for things like UUCP to work efficiently.
In fact, an examination of the tty I/O routines in uucico would be
an excellent way to figure out just how to do this. (There are more
system dependencies in this area than I care to admit. You're better
off grabbing someone elses debugged code. The routines in Taylor UUCP
are a good place to work from.)

Jeez, it's been a *long* time since I've played with this stuff :-)

If you really get stuck, just hang on for a bit. I'm expecting my
TAC to ship sometime soon. Once everything is assembled I'll be
writing a UNIX interface for BSD that should easily port to Linux.

--lyndon
```

35. [TACGPS:590] Re: TAC and Unix

From: mdf@angoss.com (Matthew Francey)
Date: Thu, 4 Sep 1997 15:01:33 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199709041950.TAA26462@hydrogen>
Rendered body type: text/plain

```
>In the Olde Days(tm) we used VMIN in conjunction with raw mode in the
>tty driver. When VMIN != 0 it told the tty driver to delay returning
>data for up to VMIN tenths (?) of a second as long as data continued
>to arrive.

Minor nit:  I think that is VTIME.  VMIN is the minimum number of bytes to
wait for before returning.  The Linux manpages go on about this.  (Or they
should).

For the Oncore receiver, you probably want to set VMIN to 0, VTIME to 1
(ie, 1/10th of a second time-out) and then do this:
```

```
        wait for the 1PPS
        try to read 800 bytes [of course, you will get less]
        digest the data
        repeat

The above should work [I haven't tried it yet 'cuz I've been DSPing for a
while] because the Oncore's sequence of events on the serial line is:

        1PPS rise
        max 50ms delay
        <blob-o-data -- limited to 750ms in length>
        <delay to next second>

Hence, the VTIME-out won't be triggered by the first delay, but will
be triggered by the last one.  All you have to be sure is that you
can process all the data returned by the GPS within 100ms.  Which
ought to be more than enough time for most computers out there re:
displaying date/time and other stuff.

For Linux, the proper way to wait for the 1PPS is to configure the tty
in CLOCAL mode, and then use the TIOCMIWAIT ioctl() to wait for the CD.
If there is no manpage help for TIOCMIWAIT, then see the kernel source
/usr/src/linux/drivers/char/serial.c.
```

36. [TACGPS:591] Lowe vs. Trimble

```
From: "Eric Rosenberg" <erosenberg@orbcomm.net>
Date: Thu, 4 Sep 1997 16:59:57 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <9708048734.AA873421051@smtp_link.orbcomm.net>
Rendered body type: text/plain

I'm now looking for an antenna for my (as yet undelivered) TAC-2.

Is the Lowe the same antenna as the Trimble (p/n 28367-00) that Paccomm
sells?  They both look like the unit Panasonic makes for our Orbcomm
communicators!

Thanks in advance,

Eric W3DQ

--
erosenberg@orbcomm.net
```

37. [TACGPS:592] Re: Lowe vs. Trimble

```
From: gregory.beat@mediaone.net (Gregory Beat)
Date: Thu, 4 Sep 1997 17:54:12 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <340F3A30.D79D664D@mediaone.net>
Rendered body type: text/plain

Eric,

> I'm now looking for an antenna for my (as yet undelivered) TAC-2.

After I played on the bench my "homemade" patch antenna, I calledArt
Sepin at Synergy Systems and inquired about various antennas.
I will pass along some part numbers, if anyone else is also interested
in contacting Synergy [not a endorsement - just information].

I ordered the grey "hockey puck" GPS antenna [Tom Clark's name for it]
# ANT62301A2.  Do not forget the magnetic mount for the antenna
# MNT62314A1, if that is what you want.  Both of these cost
around $ 65.00 plus shipping.

This antenna has a straight-on OCX(MCX) connector, just like the
Oncore VP receiver from TAPR.

Since I was on the phone, I picked up two six (6) meter RG58 cables
from Synergy as well.

OSX/OSX (both right angles) # SSCABVP0058N-6

OSX/BNC (right angle OSX, straight on BNC) # SSCABXT0058N-6

It is nice when soemone has the crimp tool for the OSX conenctor
to make these up.  If you wanted to save money you could order one
of the cables with OSX on both ends, cut the cable and apply your own
BNC
```

connector. If you do that, remember to measure the length for
entering the proper latency value into Tom's SHOWTIME program.

I did find Art and the Synergy staff patient and extremely helpful.

Hope it is helps in making your decision.

Cheers.

G. Beat
W9GB

gregory.beat@mediaone.net

38. [TACGPS:593] Re: Oncore VP+Unix

From: Lyle Johnson <lylej@azstarnet.com>
Date: Thu, 4 Sep 1997 22:43:39 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19970904202755.00784f44@pop.azstarnet.com>
Rendered body type: text/plain

At 10:14 AM 9/4/97 -0500, Bill Broadley wrote:
>
>Hello all,
>
>Got the Oncore working by using a friends dos box to get it all setup.
>I'm using the Interface Board Kit by McKinney Technology to connect
>via a db-9.
>
>I'll append the code I used to display the 1 second pulses (sorry it's
>just motorola binary format raw). Anyone know of some documentation
>for the format? the stuff I got with TAPR's kit is very lacking. Frustrating
>to have a reference to a command description, but it wasn't included 8-(
>
>Unfortunately I was playing around with ioformat trying to get it
>into NMEA mode so I can setup a stratum 1 time server. The unfortunate
>part is somehow I got it into one of the other modes and
>now it's completely quiet. Anyone know the command to get into NMEA mode?

>From Motorola Binary format:
        @@CimX<CR><LF> m=0=switch to Motorola Binary Format
                                m=1=switch to NMEA-0183 format
                                m=2=switch to LORAN format
                                X=checksum
                                message length 8 bytes

>Anyone know the NMEA command to send position every second or
>similiar? (I might have succeeded in switching to NMEA but now
>it's not automatically sending updates when I connect at 4800).

        $PMOTG,GGA,yyyyCC<CR><LF>

                                yyyy=update rate (0..9999)in seconds
                                CC=optional checksum

>Anyone know the Loran command to send a position? (I might have
>suceeded in switching to Loran but now it's not automatically
>sending updates when I connect at 1200).

        Z<CR><LF>   This is a poll and you get one posiiton output
        Tssss<CR><LF>   ssss is (0..9999) seconds

>I'm very encourage though to get a position fix, track satalites
>etc with the dos software. Now to get similiar for linux.
>

39. [TACGPS:594] Oncore+unix+ntp stratum-1

From: Bill Broadley <bill@math.ucdavis.edu>
Date: Fri, 5 Sep 1997 07:04:24 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199709051201.FAA06173@proto.math.ucdavis.edu>
Rendered body type: text/plain

Hello all,

Thanks for all the help. In particular Doug McKinney for many emails,
documentation, commands and other stuff. And numerous others
who suggested commands, c code, antenae vendors, url's and other stuff.

I ordered the $50 Oncore guide from Synergy systems.

Using Linux, Lowe Antenae, Oncore VP, McKinney serial board, and xntpd I
now have a stratum-1 time server running off the oncore in NMEA mode.
I may tackle motorola's binary mode after I get the manual.

I plan to record the GPS error for post processing recorded data
to remove error, display various info about satalites, and do
play with position averaging once I get more documentation. The current
plan is to write a program to collect into from the gps, and then
feed only whats needed to the xntpd daemon. Then CGI/Java programs
to play with the rest of the available data.

I've also recall a comment about a nice system call to use with linux
to detect the PPS signal. It's a shame to hide 50-100 ns latency behind
one second pulses over a serial line. I'm not sure my Oncore has one actually.

Anyone else with a tapr Oncore VP know if the "optional" PPS signal
is included?

I've only written small code snippets so far, a dump everything the
gps sends script, and a few tiny scripts to append <CR><LF>, one
to do checksums, and one to dump the binary format. They made it much
easier to communicate with the GPS.

Oh the NMEA command to get the Oncore VP from motorola binary
into the appropiate NMEA mode:
@@Ci\01+<CR><LF>   \01 means a character with value 1.

Once in NMEA mode you need to do a:
$PMOTG,RMC,0001

Thats it now just fire up xntpd with the NMEA driver, make a link to the
write device and it works...

[bill@avalon bill]$ ntptrace localhost
localhost: stratum 1, offset 0.000045, synch distance 0.01416, refid 'GPS'

xntpdc> peers
     remote   local   st poll reach delay   offset   disp
==
=lobata.math.ucd 168.150.200.1   2 1024 377 0.04314 0.190771 0.00629
*GPS_NMEA(0)   127.0.0.1   0   64 377 0.00000 -0.002872 0.01770
=chrysolepis.mat 168.150.200.1   3 1024 377 0.04181 0.188916 0.00992

--
Bill Broadley   Bill@math.ucdavis.edu   UCD Math Sys-Admin
Linux is great.   http://math.ucdavis.edu/~bill   PGP-ok

40. [TACGPS:595] Re: TAC and Unix

From: "Henk Uijterwaal (RIPE-NCC)" <henk@ripe.net>
Date: Fri, 5 Sep 1997 08:14:55 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <Pine.SUN.3.95.970905145650.25830A-100000@ncc.ripe.net>
Rendered body type: text/plain

On Thu, 4 Sep 1997, Matthew Francey wrote:

> >In the Olde Days(tm) we used VMIN in conjunction with raw mode in the
> >tty driver. When VMIN != 0 it told the tty driver to delay returning
> >data for up to VMIN tenths (?) of a second as long as data continued
> >to arrive.

> Minor nit: I think that is VTIME. VMIN is the minimum number of bytes to
> wait for before returning. The Linux manpages go on about this. (Or they
> should).

I tried playing with those 2, no success.

> For Linux, the proper way to wait for the 1PPS is to configure the tty
> in CLOCAL mode, and then use the TIOCMIWAIT ioctl() to wait for the CD.
> If there is no manpage help for TIOCMIWAIT, then see the kernel source
> /usr/src/linux/drivers/char/serial.c.

We're in a BSD environment and I couldn't find anything remotely
resembling TIOCMIWAIT there.   We do have 1 linux box though, man ioctl
and man ioctl_list don't mention TIOCMIWAIT. From the kernel source,
I figured that I should add a

```
    printf ("Calling ioctl\n");
    result = ioctl (device, TIOCMIWAIT);
    printf ("Result %d\n", result);
    read (device, buffer, 800);
```

It now looks as if there is a pause between the two printf's. BUT
the output still doesn't resemble anything that I'd expect. Did I
still miss something?

BTW. We also have Motorola Oncore Evaluation kit. I connected that
one to the port where the TAPR is sitting and ran the program
again. It then does produce sensible output. However, this unit
doesn't give a 1 pps output to the computer (the CD pin in the connector
that goes into the computer isn't even connected to anything). Also,
the unit works fine with the SHOWTIME program. So,
I'm now reasonably sure that the 1pps interferes with the program
reading the com port. The question remains how do I get around this?

Henk


```
--------------------------------------------------------------------------------
Henk Uijterwaal                     Email: henk.uijterwaal@ripe.net
RIPE Network Coordination Centre      WWW: http://www.ripe.net/home/henk
Singel 258                          Phone: +31.20.5354414
1016 AB Amsterdam                     Fax: +31.20.5354445
The Netherlands                      Home: +31.20.6651962
--------------------------------------------------------------------------------
```


%DCL-E-NOCFFE, unable to locate coffee - keyboard input suspended.

41. [TACGPS:596] RE: TAC32 - Further revisions

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Fri, 5 Sep 1997 13:52:59 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCBA0B.1955EF00.rick@cnssys.com>
Rendered body type: text/plain

Greg,

TAC32 Version 1.0.3 (alpha) for Win95/NT is now ready. I have completely
rewritten the startup code so the clock should come up reliably now. The
set serial port options now include "Search", "Mot Bin", "Mot NMEA", and
"Garmin". Your last mode is saved and used again on startup significantly
speeding up the startup process. If the receiver is not recognized, the
clock fields are blanked out.

The Garmin is now supported, at least in part. I don't have access to a
Garmin so I hope someone will try it out.

Rick
WB2TNL

-----Original Message-----
From: Gregory Beat [SMTP:gregory.beat@mediaone.net]
Sent: Tuesday, September 02, 1997 9:59 PM
To: tacgps@tapr.org
Subject: [TACGPS:581] RE: TAC32 - Further revisions

Richard M. Hambly wrote:

> I have a good handle on the Garmin issue, I just need a little time to
> code
> the solution. It is now the top priority. I will be changing the
> serial
> port dialog box to allow for more selections such as "Search for a GPS
>
> receiver" and fixed modes for "Motorola Binary", Motorola NMEA" and
> "Garmin
> NMEA".

I did install your new version. First, always remember to close the
TAC-32 programthat is running when you perform Install fromthe Web.

Nice error message, but you
do have to start over again.

When I started program, the clock appears but not SNR graph or
satellite IDs. I checks the "Set the serial port" and noted the program

did not default to either NMEA or Motorola - the selection was "null" or
blank.

Closed program and restarted and running as before (although I did not
pay attention
to the second timing differential in the ewarlier version)

> I will also allow setting the baud rate so we can operate these
> units at their fastest allowable rates which will make the display
> more
> responsive. All selections in TAC32 are saved between sessions (even
> the
> placement on the screen). This will speed up the initialization of the
>
> program and make it more reliable.

Great idea .....

> Just as it was difficult to design the hardware to accommodate all the
>
> receivers, so it is difficult to design the software to do the same.
> For
> example, it is not enough to say you want the Garmin to work at 9600
> baud -
> the software has to magically discover what baud rate the receiver is
> set
> to and then issue the change baud rate command to the receiver before
> changing the computer's baud rate. Not really all that hard to do,
> just
> takes time.

As an FYI, I am running the Oncore VP (8 channel) receiverSoftware
version & Rev # 8
Software date: August 6, 1996
Option IB

Nice to see the tacgps group so busy ......

G. Beat
W9GB

42. [TACGPS:597] RE: TAC32 - 1.0.3 (alpha)

From: gregory.beat@mediaone.net (Gregory Beat)
Date: Fri, 5 Sep 1997 16:20:21 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3410772E.44CC7136@mediaone.net>
Rendered body type: text/plain

Richard M. Hambly wrote:

> TAC32 Version 1.0.3 (alpha) for Win95/NT is now ready. I have
> completely
> rewritten the startup code so the clock should come up reliably now.
> The
> set serial port options now include "Search", "Mot Bin", "Mot NMEA",
> and
> "Garmin". Your last mode is saved and used again on startup
> significantly
> speeding up the startup process. If the receiver is not recognized,
> the
> clock fields are blanked out.

Well let's see ....

The satellite graph on the right appeared to work corectly throughout
this version,
except as noted below.

Yes, TAC32 did blank the clock fields for my Oncore VP receiver and the
main clock in the upper left was "frozen" at the one time (PC or GPS
clock?)
upon program start up. I highlighted the clock digit field, hit the
delete key

and received a frozen picture of the other clock and position fields.
[always do things you are not suppose to do during an alpha test, sneaky
too].

I was able to change the Motorola receiver with the Set Port command and
then "view"
the raw data from the Oncore. Under NMEA, I had all 12 sat graphs
working under
Binary I did not seem to be "seeing" the 7th satellite (all zeroes)
this later corrected.
Parsing issue?

When I put it into Search mode .... it seemed to "find" the Motorola
Binary mode quickly,
but still frozen clock.

TAC32 eventaully seemed to decide my receiver was okay and
45 to 60 seconds later after program startup, the clock started running.

I will continue to start and restart program over the weekend to try to
pin this
"cause" down for you.

I also had a "148" error the first time that I tried to install the
program with
Install Across the Web and the setup/install speed appeared to be much
slower this time around (could be net congestion on either of our ends)

> The Garmin is now supported, at least in part. I don't have access to
> a
> Garmin so I hope someone will try it out.

I am sure that someone with a Garmin GPS-20 will try TAC32 andrespond to
the discussion group.

Cheers.

G. Beat
W9GB

43. [TACGPS:598] Oncore Evaluation Kit - 1 pps ?

From: gregory.beat@mediaone.net (Gregory Beat)
Date: Fri, 5 Sep 1997 18:05:32 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <34108F68.6B8EE71F@mediaone.net>
Rendered body type: text/plain

Henk Uijterwaal (RIPE-NCC) wrote:

    [snip]

> BTW. We also have Motorola Oncore Evaluation kit. I connected that
> one to the port where the TAPR is sitting and ran the program
> again. It then does produce sensible output. However, this unit
> doesn't give a 1 pps output to the computer (the CD pin in the
> connector
> that goes into the computer isn't even connected to anything). Also,
> the unit works fine with the SHOWTIME program. So,
> I'm now reasonably sure that the 1pps interferes with the program
> reading the com port. The question remains how do I get around this?

If you indeed have the Motorola Oncore Evaluation kit, you should also
have thePower/Data cable that came with the kit. The 1 PPS signal
should be found
on the separate Yellow pin with the Orange pin serving as the
ground/return for
the signal.

The other pins on the Evaluation Kit Power/Data cable (from Motorola
doucmentation)

Yellow   1 pps
Orange   1 pps return
White/Clear   Power return (gnd for 12 VDC & 5 VDC)
Brown   5 volt battery backup
            for receivers without lithium
            battery option
Blue   Main power (+12 VDC)
Green   VPP (not used)

You may be able to "jumper" this to your correct pin or
you could make up a cable that would place the
PPS signal on the serial port pin you desire.

For the Oncore VP series of receivers
the model number determines the "features" or "options"

The following Model numbers are the standard
Oncore VP production configurations.
ALL exhibit less than 50 ns for 1 PPS & have RTC (clock)

B3121P111x   right angle antenna connector
B4121P115x   straight antenna connector [TAPR group buy model]
B3121Z111x   right angle antenna connector, carrier phase option
B3221Z111x   right angle antenna connector, carrier phase & battery
option

Source for above Oncore Tech Notes can be found on
http://www.tapr.org and were provided by Synergy Systems.

73

G. Beat
W9GB

44. [TACGPS:599] Re: Enclosure for TAC-2

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Sat, 6 Sep 1997 10:27:29 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <v03110701b03730d8259f@[208.134.134.40]>
Rendered body type: text/plain

The first enclosure we will be making available will be the one that fits
inside a PC disk space. I'll attach a jpeg image of the concept we started
with earlier this year.

Should have something to announce in the next few weeks.

We have a enclosure fab house in Dallas that our mechanical eng consultant
uses and we have had very good result from them and good prices. Thanks
for the ref...I'll keep it handy for the future.

Cheers - Greg

>There had been some discussion earlier this year and in the latest TAPR
>newsletter
>that a box may be fabricated for the TAC-2. May I suggets that you look
>at
>the cases at Lansing Instrament in Ithaca, NY (800)-847-3535 .
>
>There are not many companies that will do enclosures for prototypes or
>quantity of
>one - they have for other projects.
>
>G. Beat
>W9GB
[Attachment: tac2.fdd.jpeg.jpg; image/jpeg; 0 bytes]

45. [TACGPS:600] Re: Oncore VP+Unix

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Sat, 6 Sep 1997 13:15:35 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <v03110718b03756f0a099@[208.134.134.40]>
Rendered body type: text/plain

>> I'll append the code I used to display the 1 second pulses (sorry it's
>> just motorola binary format raw). Anyone know of some documentation
>> for the format? the stuff I got with TAPR's kit is very lacking.
>Frustrating
>> to have a reference to a command description, but it wasn't included 8-(
>
>ONCORE User's Guide should be available from Synergy System (Art Sepin) for
>about $50. If he can not sell it to you because of**** then contact me and
>I can purchase the from Art. I am an OEM with Art.

I see that Doug answered most of this question.

I think the manual now costs $80. Anyway, the VP GPS engines we are

providing normally come with _no_ documentation. You are suppose to get
that when you get the $1000+ first package as Doug referred to in an
earlier message. So, while you might believe that the few pages we are
providing are lacking -- well that is all we can provide. If you think you
need the full manual, just call Synergy System and order it from them.
Probably something we need to add to the FAQ as we create it.

The Moto Oncore VP GPS is one reason we have a working agreement with
Synergy Systems on stuff like this. Art is great to work with and we hope
that by making these types of things available to experimenters that Art
will see future commercial sales. We get the benefit of a good price break
based on some of our experimenters doing future commercial stuff down the
road. As my father would say "priming the pump". A win-win situation for
them and TAPR.   What we try to setup on many of our commercial
arrangements.

Anyway, drop an e-mail to <synergy@synergy-gps.com>. Art should be able to
take care of you.

Doug and myself talked about doing some type of book or manuscript about
these issues, but just talk thus far. Maybe we need to talk further and
see what we have.

Cheers - Greg

Greg Jones, WD5IVD
Austin, Texas
wd5ivd@tapr.org
http://www.tapr.org/~wd5ivd

    "Before you become too entranced with gorgeous gadgets
     and mesmerizing video displays, let me remind you that
     information is not knowledge, knowledge is not wisdom,
     and wisdom is not foresight. Each grows out of the other
     and we need them all."   -Arthur C. Clarke

46. [TACGPS:602] GPS-30PC Offer Extension

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Sat, 6 Sep 1997 13:55:39 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <v0311071eb03761f03674@[208.134.134.40]>
Rendered body type: text/plain

With the demand for the GPS30PC and the PSR getting out about 3 weeks late,
Garmin has given us an extension until Sept 15th now to take orders for the
GPS30PC.

If you still want to get a GPS30PC, just call the TAPR office (940)
383-0000 or fax (940) 566-2544.

E-mail is down at this time, so phone or fax please.

For details, check out http://www.tapr.org/gps

Cheers - Greg, WD5IVD

Greg Jones, WD5IVD
Austin, Texas
wd5ivd@tapr.org
http://www.tapr.org/~wd5ivd

    "Before you become too entranced with gorgeous gadgets
     and mesmerizing video displays, let me remind you that
     information is not knowledge, knowledge is not wisdom,
     and wisdom is not foresight. Each grows out of the other
     and we need them all."   -Arthur C. Clarke

47. [TACGPS:603] Re: Oncore+unix+ntp stratum-1

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Sat, 6 Sep 1997 13:55:44 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <v0311071fb03762f573bd@[208.134.134.40]>
Rendered body type: text/plain

>I ordered the $50 Oncore guide from Synergy systems.

Glad you were able to get the manual from Art and the gang. It is pretty
think and complete.

>Using Linux, Lowe Antenae, Oncore VP, McKinney serial board, and xntpd I
>now have a stratum-1 time server running off the oncore in NMEA mode.
>I may tackle motorola's binary mode after I get the manual.

>I plan to record the GPS error for post processing recorded data
>to remove error, display various info about satalites, and do
>play with position averaging once I get more documentation. The current
>plan is to write a program to collect into from the gps, and then
>feed only whats needed to the xntpd daemon. Then CGI/Java programs
>to play with the rest of the available data.

Great work Bill. I look forward to reading more about this.

One reason we do stuff like this through TAPR.

Cheers - Greg

Greg Jones, WD5IVD
Austin, Texas
wd5ivd@tapr.org
http://www.tapr.org/~wd5ivd

    "Before you become too entranced with gorgeous gadgets
     and mesmerizing video displays, let me remind you that
     information is not knowledge, knowledge is not wisdom,
     and wisdom is not foresight. Each grows out of the other
     and we need them all."   -Arthur C. Clarke

48. [TACGPS:604] RE: TAC32 - 1.0.3 (alpha)

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sat, 6 Sep 1997 18:00:27 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCBAF7.12FA1900.rick@cnssys.com>
Rendered body type: text/plain

Greg,

TAC32 for Windows 95 and NT is now available at
http://www.cnssys.com/tac32. It corrects a few bugs (see below) and adds a
"heart beat" display in the status bar and a few new display parameters.

Rick
WB2TNL

Notes on your last e-mail:

> Yes, TAC32 did blank the clock fields for my Oncore VP receiver and the
> main clock in the upper left was "frozen" at the one time (PC or GPS
> clock?) upon program start up.

That's always the PC time. In this case it's a snapshot.

> I highlighted the clock digit field, hit the delete key
> and received a frozen picture of the other clock and position fields.
> [always do things you are not suppose to do during an alpha test, sneaky
> too].

I was not able to duplicate this.

> I was able to change the Motorola receiver with the Set Port command and
> then "view" the raw data from the Oncore. Under NMEA, I had all 12 sat
graphs
> working under Binary I did not seem to be "seeing" the 7th satellite (all
zeroes)
> this later corrected. Parsing issue?

I was not able to duplicate this. Could be related to the next problem.

> When I put it into Search mode .... it seemed to "find" the Motorola
> Binary mode quickly, but still frozen clock.
> TAC32 eventually seemed to decide my receiver was okay and
> 45 to 60 seconds later after program startup, the clock started running.

Fixed.

> I will continue to start and restart program over the weekend to try to
> pin this "cause" down for you.

> I also had a "148" error the first time that I tried to install the
> program with Install Across the Web and the setup/install speed appeared
to be much
> slower this time around (could be net congestion on either of our ends)

When the bugs get worked out I will be upgrading to a new version of this
auto installer.

>> The Garmin is now supported, at least in part. I don't have access to
>> a Garmin so I hope someone will try it out.
> I am sure that someone with a Garmin GPS-20 will try TAC32 and respond to
> the discussion group.

No takers, yet. Allen, where are you?

49. [TACGPS:605] Comments after arriving back home

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Sat, 6 Sep 1997 21:58:06 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <34120987.49FE@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Hi Gang -- back home from the latest trip. My travel this summer has
been absolutely unreal! The latest trip was to Brazil as you may have
gleaned from my one almost illegible message sent over a rusty barb
wire internet connection. Had two downers on this trip -- while checking
into a hotel in Fortaleza, some sneak thief stole my bag with my laptop
computer and my digital camera in it -- at total loss of ~$8000. Then I
arrived back home with a horrible cold and am only half with it now.

Glad to see all the software activity supporting the TAC. Tonite I was
able to fetch Rick's latest TAC32 code and have several comments after
a few minutes of testing with my 8-channel ONCORE prototype:

(1) One bug I find is in the Navigation Position Data in NMEA mode.
Apparently the East=+/West=- longitude sign is not propagated properly.
The Long seems OK in MOT Binary, but in NMEA my Long = 76d 56+ West
displays as -75d 03+. The algorithm needs to take the +/- sign from
the E/W indicator and apply it to all fields. I suspect the N/S Latitude
sign has the same problem.

(2) On one occasion, toggling between Mot Bin & Mot NMEA, I got the
W95 "invalid op" error message. Can't seem to repeat it.

(3) The new sorting by PRN (which should be capitalized)/El/Az/SNR
buttons are nice. In SHOWTIME, I offer only the EL sort. I'd suggest
that the EL sort be descending, with the highest elevation satellites
at the top of the list.

(4) My personal preference would be for the BIG digits to be true UTC,
not PC time.

(5) Comparing the functionality of TAC32 to SHOWTIME, the main
differences I see are:

a. SHOWTIME allows you to average the position reported by the
   receiver. This has proven to be a reliable way to determne
   position to the ~5 meter level. TAC32 still only shows the
   "raw" instantaneous position.

b. SHOWTIME handles the setup of a number of parameters to optimize
   timekeeping for "laboratory" applications. By forcing the ONCORE
   into "zero-D" mode with the position locked, I routinely get
   30 nsec or better accuracy & precision. TAC32 (so far) runs in
   "3-D" mode and the accuracy is limited to a couple of hundred
   nsec. Also, SHOWTIME allows the 1PPS hardware pulse epoch to be
   shifted either early or late. This is needed to achieve accuracy
   of a few tens of nsec (with respect to the USNO's master clock)
   by compensating for propagation delays in cables, and it can be
   used to intentionally bias the timing away from the UTC second
   (which is very useful in practice).

c. SHOWTIME has a couple of other "bells 'n whistles" which I put
   in 'cuz I liked them:

- It will compute your Maidenhead Grid Square
- It can make "fake WWV" time ticks which makes setting other clocks a lot easier.

In talking with Rick, he plans to implement several of the SHOWTIME "widgets" after he gets the basic structure solidified.

(6) Regarding SHOWTIME -- it is now a year since I made any changes. Since SHOWTIME was written in compiled QuickBasic 4.5, it suffers badly from the limitations of the stock MessDOS/QB45 serial I/O routines, especially when trying to run under WinDoze. I have found a shareware SIO package that looks like it might solve the problems, but it will take some time to incorporate it into the code. I'm torn between the desire to make SHOWTIME be more bullet-proof and the desire to get back to working on the TOC (TAC Oscillator Controller -- a TAC-2 expansion board that will make a nearly-Rubidium quality frequency standard with stability in the 1:10e9 to 1:10e10 level). I'd appreciate your inputs on the priorities. [Or maybe one of you is a QB45 or PowerBasic expert who would step in and give me a hand?].

73, Tom

50. [TACGPS:606] Reply to Henk Uijterwaal

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Sat, 6 Sep 1997 22:04:59 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <34120BA0.29B7@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Henk Uijterwaal (RIPE-NCC) wrote:

    [snip]

> BTW. We also have Motorola Oncore Evaluation kit. I connected that
> one to the port where the TAPR is sitting and ran the program
> again. It then does produce sensible output. However, this unit
> doesn't give a 1 pps output to the computer (the CD pin in the
> connector
> that goes into the computer isn't even connected to anything). Also,
> the unit works fine with the SHOWTIME program. So,
> I'm now reasonably sure that the 1pps interferes with the program
> reading the com port. The question remains how do I get around this?

Regarding hardware changes to the EVAL kit, you will find what you need to do to make a "fake TAC" documented on my aleph ftp site: Fetch URL

     ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/emulate.txt
and ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/emulate.zip

The .txt file describes the modification, while the .zip file also has a schematic drawing in it.

Tom

51. [TACGPS:607] Re: Comments after arriving back home

From: Lyle Johnson <lylej@azstarnet.com>
Date: Sat, 6 Sep 1997 22:43:59 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19970906203730.00cb87e0@pop.azstarnet.com>
Rendered body type: text/plain

>...I'm torn between the
>desire to make SHOWTIME be more bullet-proof and the desire to get back
>to working on the TOC (TAC Oscillator Controller -- a TAC-2 expansion
>board that will make a nearly-Rubidium quality frequency standard with
>stability in the 1:10e9 to 1:10e10 level). I'd appreciate your inputs
>on the priorities.

I vote for TOC (who's surprised :-)

Lyle

52. [TACGPS:608] Another TAC32 Glitch

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Sat, 6 Sep 1997 23:55:57 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <34122570.1A06@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Rick -- another buglet I spot. With TAC32 running in Mot BIN, it
reports "9 visible, 6 tracked" while there are 8 satellites showing
bars on the panel! I then go to Mot NMEA, and only 5 satellites
show non-zero SNRs.

I believe this points up a couple of problems:

a. The scaling for SNRs that are "good" in BIN is probably wrong, and
   you should verify the "good" status by making sure in the @@Ea msg
   that the channel tracking (which has values 0-8) has climbed all
   the way to an 8 and also that bit 4 of the channel status is not
   reporting bit 3 (satellite inaccurate) or bit 4 (satellite unhealthy)

b. Are you picking up the visible/tracked satellites by counting or
   from "nt" data in @@Ea?

Tom

53. [TACGPS:611] TAC32 V1.0.5 Now available

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sun, 7 Sep 1997 12:46:25 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCBB93.DFEEFF60.rick@cnssys.com>
Rendered body type: text/plain

Tom,

TAC32 Version 1.0.5 is now available at http://www.cnssys.com/tac32. This
version addresses the issues you raised in your two e-mails (see below).

Rick
===========

> .. Navigation Position Data in NMEA mode.
> Apparently the East=+/West=- longitude sign is not propagated properly.

FIXED.

> On one occasion, toggling between Mot Bin & Mot NMEA, I got the
> W95 "invalid op" error message. Can't seem to repeat it.

Unable to duplicate.

> I'd suggest that the EL sort be descending, with the highest elevation
satellites
> at the top of the list.

I agree. This is implemented. Also, the EbNo (SNR) column is now reverse
sorted
for consistency with the new EL reverse sort.

> My personal preference would be for the BIG digits to be true UTC,
> not PC time.

Now you can choose which display to show. The PC display selection is now
in local time to eliminate any confusion. The choice is saved and restored
when the program is restarted.

> Comparing the functionality of TAC32 to SHOWTIME, the main
> differences I see are ...

TAC32 will have ALL the features of SHOWTIME, and more. I just need the
time to finish it. The first priority has been to get the initial features
running reliably and correctly because everything else builds on that
foundation. I am putting in a lot of hours lately because TAC32 must
mature to support all those new TAC kits that are getting into peoples
hands.

> Regarding SHOWTIME -- it is now a year since I made any changes.
> ... I'm torn between the
> desire to make SHOWTIME be more bullet-proof and the desire to get back
> to working on the TOC

Work on TOC! SHOWTIME is good enough for now and TAC32 will be fully
functional soon. Others are working on Unix software. We need the TOC.

> With TAC32 running in Mot BIN, it reports "9 visible, 6 tracked" while
there are 8 satellites showing
> bars on the panel! I then go to Mot NMEA, and only 5 satellites show

non-zero SNRs.
> ...
>   The scaling for SNRs that are "good" in BIN is probably wrong, and
>   you should verify the "good" status by making sure in the @@Ea msg
>   that the channel tracking (which has values 0-8) has climbed all
>   the way to an 8 and also that bit 4 of the channel status is not
>   reporting bit 3 (satellite inaccurate) or bit 4 (satellite unhealthy)

I have added these tests. For now, if the channel tracking is not 8 then
the EbNo will show a negative number (-1 to -7) as a flag. If the
"unhealthy" bit is set, the EbNo will be set to -9. These flags are for
testing. I want to know if these conditions occur. Later I will build a
separate window, accessible from the View menu, to show all the satellite
data fields for those who want to know what's really happening up there.

I noticed that the NMEA and BIN messages do not always agree on the
satellites in view and tracked numbers. I don't know why this is happening
but I report what the messages tell me. I have not seen a mismatch between
the "tracked" and the EbNo data within a mode, however.

>   Are you picking up the visible/tracked satellites by counting or
>   from "nt" data in @@Ea?

I am using the "nt" data.

54. [TACGPS:613] Garmin vs. Motorola, Computerless operation

From: "Gordon T. Uber" <gordon@ubr.com>
Date: Sun, 7 Sep 1997 14:21:42 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <2.2.16.19970907121530.2b07262a@best.com>
Rendered body type: text/plain

A friend, Paul Hopkins, is trying to decide between the Garmin
and Motorola GPS engines from TAPR. He wants a 1 PPS timebase
precise to better than 100 microseconds for timing high-accuracy
mechanical pendulum clocks.

1. Which of the two choices provides more reliable operation?

2. Can he set up and use both of these without Showtime and
without a computer if he only needs the 1 PPS?

3. Should he use one of these directly without the TAC-2 kit?

Please send your replies to me or the list, since he has no Internet
connection.

Thanks.

Gordon

--
| XII | Gordon T. Uber, 3790 El Camino Real, Suite 142
| XI | Palo Alto, CA 94306-3314, email: gordon@ubr.com
| X \   /| CLOCKS and TIME: http://www.ubr.com/clocks/
| IX   \ / | Reynen & Uber WebDesign: http://www.ubr.com/rey&ubr

55. [TACGPS:614] Latest TAC32

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Sun, 7 Sep 1997 15:45:07 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3412FF1F.619A@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Rick -- thanks for incorporating the changes. I see one (new?)
problem in the Nav position report in NMEA. You are reporting
under Alt(GPS) the geoid separation, not the MSL altitude
corrected for the geoid separation.

It is these very fields that drove me to distraction in SHOWTIME.
Motorola's latest ONCOREs finally have it right, but I chose to
support all the previous firmware versions too. In the early
firmware, they reported GPS hgt, not the NMEA specified MSL
height. After they made the change from WGS84 to MSL, they got
the sign of the correction wrong. So of the 4 possibities for
the two fields [WGS84 vs MSL, +/- sign] they have used 3 of them!

Specifically, here (as best as I could glean) are the firmware
versions that apply:

```
 0.x to 4.x        --- don't know -- these are real antiques
 5.x to 6.9    Reported hgt = WGS but Geoid Sign is correct
 7.x               --- to my knowledge these revs were never used
 8.0 to 8.6    Reported hgt = MSL and Geoid Sign is wrong
 8.7 onwards   Reported hgt = MSL and Geoid Sign is finally correct!

FYI -- The Garmins and Trimbles have always had it correct.

When the sign is corrected, then
   (WGS84 HGT) = (NMEA MSL HGT) + (Correct NMEA Geoid Separation)

Tom
```

56. [TACGPS:615] TAC32 alpha [1.0.5]

```
From: gregory.beat@mediaone.net (Gregory Beat)
Date: Sun, 7 Sep 1997 16:06:17 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <341316F3.60237D6D@mediaone.net>
Rendered body type: text/plain
```

```
Rick,

Had other duties this weekend .... and I see that
you now have a 1.0.5 alpha release --- I will skip 1.0.4,
perform the update and testing.

Tom Clark (W3IWI) wrote:

> Specifically, here (as best as I could glean) are the firmware
> versions that apply:
>
>  0.x to 4.x        --- don't know -- these are real antiques
>  5.x to 6.9    Reported hgt = WGS but Geoid Sign is correct
>  7.x               --- to my knowledge these revs were never
> used
>  8.0 to 8.6    Reported hgt = MSL and Geoid Sign is wrong
>  8.7 onwards   Reported hgt = MSL and Geoid Sign is finally
> correct!

The nice part about this logic is that you have already
"captured"the version number and revision number.  FYI, my Oncore
is 8.8  ---
so I won't be able to verify the 8.0 to 8.6 code.

> FYI -- The Garmins and Trimbles have always had it correct.
>
> When the sign is corrected, then
>    (WGS84 HGT) = (NMEA MSL HGT) + (Correct NMEA Geoid
> Separation)

As I mentioned earlier, once the "math & calcualtions" are
correct for
the Motorola and Garmin, the key will be how the various pieces
of
information are organized (or presented to end user) in the
windows interface.

I am looking at Tom Clark's SHOWTIME program as well as other
time and
clocking packages to observe common threads [Reverse engineering
a TAC32
requirements document]

G. Beat
W9GB
```

57. [TACGPS:616] Garmin vs. Motorola, Computerless operation (fwd)

```
From: Bill Broadley <bill@math.ucdavis.edu>
Date: Sun, 7 Sep 1997 16:06:21 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199709072105.OAA22744@proto.math.ucdavis.edu>
Rendered body type: text/plain
```

```
>A friend, Paul Hopkins, is trying to decide between the Garmin
>and Motorola GPS engines from TAPR. He wants a 1 PPS timebase
>precise to better than 100 microseconds for timing high-accuracy
>mechanical pendulum clocks.
>
```

>1. Which of the two choices provides more reliable operation?

No experience with the other but Oncore VP has a PPS which is
rated to have a 50 ns accurate PPS when in position hold mode.

>2. Can he set up and use both of these without Showtime and
>without a computer if he only needs the 1 PPS?

I'm using the:
        http://www.tapr.org/gps/vpib.html
        VP Interface Board Kit

It's got a 1 PPS signal available on the board, and I BELIEVE (not
sure I understand this correctly), theres also a spare TTL->serial
converted on the MAX232 chip.

I'm using the above to get the PPS signal into a linux box which has
kernel support for this. It converges down to 3 ms but then
diverges I think this is a software problems as opposed to missing
PPS signals. I.e.:

```
0103         0   -56.044   342     8     2.217       594   386    38    36
0103         0   -56.044   257     8     2.217       594   386    38    36
0103         0   -56.044   193     8     2.217       594   386    38    36
0103         0   -56.044   145     8     2.217       594   386    38    36
0103         0   -56.044   109     8     2.217       594   386    38    36
0103         0   -56.044    82     8     2.217       594   386    38    36
0103         0   -56.044    62     8     2.217       594   386    38    36
0103         0   -56.044    47     8     2.217       594   386    38    36
0103         0   -56.044    36     8     2.217       594   386    38    36
0103         0   -56.044    27     8     2.217       594   386    38    36
0103         0   -56.044    21     8     2.217       594   386    38    36
0103         0   -56.044    16     8     2.217       594   386    38    36
0103         0   -56.044    12     8     2.217       594   386    38    36
0103         0   -56.044     9     8     2.217       594   386    38    36
0103         0   -56.044     7     8     2.217       594   386    38    36
0103         0   -56.044     6     8     2.217       594   386    38    36
0103         0   -56.044     5     8     2.217       594   386    38    36
0103         0   -56.044     4     8     2.217       594   386    38    36
0103         0   -56.044     3     8     2.217       594   386    38    36
0103         0   -56.044     3     8     2.217       594   386    38    36
0103         0   -56.044     3     8     2.217       594   386    38    36
0103         0   -56.044     3     8     2.217       594   386    38    36
0103         0   -56.044     3     8     2.217       594   386    38    36
0103         0   -56.044     3     8     2.217       594   386    38    36
```

I believe the 4th column is the jitter in ms.

>3. Should he use one of these directly without the TAC-2 kit?

The Oncore VP+serial board gives you a fine PPS, and should be quite
accurate. I don't have enough experience personally to say how reliable
it is. Kinda hard to debug when you don't have an oscope.

--
Bill Broadley   Bill@math.ucdavis.edu   UCD Math Sys-Admin
Linux is great.   http://math.ucdavis.edu/~bill   PGP-ok

58. [TACGPS:617] RE: Latest TAC32

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sun, 7 Sep 1997 18:08:53 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCBBC0.6EDB1DE0.rick@cnssys.com>
Rendered body type: text/plain

Tom,

I have made these corrections. Version TAC32 version 1.0.6 is now
available at http://www.cnssys.com/tac32.

I had been looking forward to figuring out the geoid issue ever since you
first mentioned this problem. I am confused about one thing, however. For
the old receivers where the "antenna height" field is reported in WGS84
instead of the correct MSL, how do I get MSL? Add the "geoid separation"
to the (incorrect) height? If so, that would explain why the next
generation receivers had the sign wrong on the "geoid separation" field.

To try to get a better handle on all this, I pulled out my copy of
NMEA-0183. Now I understand why Motorola got it wrong. NMEA didn't specify
the height field as MSL or WGS-84. It's not a very good spec.

An additional correction has been made. In Motorola BIN mode, if the receiver is an 8-channel unit, the position data, Sat visibility and tracked data were not being updated. This explains why the NMEA and BIN modes did not always agree and why the BIN mode visibility and tracked data sometimes didn't agree with the satellite data fields (EbNo, etc.). This is fixed.

Rick
WB2TNL

-----Original Message-----
From: Tom Clark (W3IWI) [SMTP:clark@tomcat.gsfc.nasa.gov]
Sent: Sunday, September 07, 1997 4:45 PM
To: tacgps@tapr.org
Subject: [TACGPS:614] Latest TAC32

Rick -- thanks for incorporating the changes. I see one (new?) problem in the Nav position report in NMEA. You are reporting under Alt(GPS) the geoid separation, not the MSL altitude corrected for the geoid separation.

It is these very fields that drove me to distraction in SHOWTIME. Motorola's latest ONCOREs finally have it right, but I chose to support all the previous firmware versions too. In the early firmware, they reported GPS hgt, not the NMEA specified MSL height. After they made the change from WGS84 to MSL, they got the sign of the correction wrong. So of the 4 possibities for the two fields [WGS84 vs MSL, +/- sign] they have used 3 of them!

Specifically, here (as best as I could glean) are the firmware versions that apply:

```
 0.x to 4.x        --- don't know -- these are real antiques
 5.x to 6.9    Reported hgt = WGS but Geoid Sign is correct
 7.x               --- to my knowledge these revs were never used
 8.0 to 8.6    Reported hgt = MSL and Geoid Sign is wrong
 8.7 onwards   Reported hgt = MSL and Geoid Sign is finally correct!
```

FYI -- The Garmins and Trimbles have always had it correct.

When the sign is corrected, then
   (WGS84 HGT) = (NMEA MSL HGT) + (Correct NMEA Geoid Separation)

Tom

59. [TACGPS:618] Antenna location for fixed TAC system?

From: John Ackermann N8UR <jra@febo.com>
Date: Sun, 7 Sep 1997 18:34:18 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199709072351.TAA03228@meow.febo.com>
Rendered body type: text/plain

How much of the sky does the antenna need to see for reliable TAC use?

I'm debating whether it's worth the effort (and increased feedline loss) to mount the GPS antenna up on my tower above the roofline, where it will have a clear shot for 180 degrees (west through north to east), and a shot through trees for the other 180 degrees. Alternatively, I can just stick the antenna out the basement window, where it will see pretty well from north through east, and then through trees (below 45 degree elevation, anyway) from east through south.

Any thoughts?

John N8UR (ex-AG9V)
jra@febo.com

60. [TACGPS:619] Antenna location for fixed TAC system? (fwd)

From: Bill Broadley <bill@math.ucdavis.edu>
Date: Sun, 7 Sep 1997 18:54:22 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199709072350.QAA23552@proto.math.ucdavis.edu>
Rendered body type: text/plain

>How much of the sky does the antenna need to see for reliable TAC use?
>
>I'm debating whether it's worth the effort (and increased feedline loss) to
>mount the GPS antenna up on my tower above the roofline, where it will have a

>clear shot for 180 degrees (west through north to east), and a shot through
>trees for the other 180 degrees. Alternatively, I can just stick the antenna
>out the basement window, where it will see pretty well from north through
>east, and then through trees (below 45 degree elevation, anyway) from east
>through south.

I believe a reliable clock only requires one satalite to be tracked.

Currently over the last 24 hours I've seen between 4-8 sats with an
average around 6. I have the antenna placed on an inside windowsill on
the 2nd story of a 2 story building. Only 30-40% of the sky is visible
but I guess it's possible it's getting signals through my roof.

If you can get the number of sats visible (easy if you have access to the
NMEA output of the gps) I'd suggest do the cheap, easy, quick solution and
if you aren't seeing enough for your tastes then you can improve it.

BTW I'm using an Oncore VP + Lowe antenae.

--
Bill Broadley Bill@math.ucdavis.edu UCD Math Sys-Admin
Linux is great. http://math.ucdavis.edu/~bill PGP-ok

61. [TACGPS:620] Re: Comments after arriving back home

From: Dave Martindale <davem@cs.ubc.ca>
Date: Sun, 7 Sep 1997 19:53:49 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <l03102001b039083f2745@[198.162.38.159]>
Rendered body type: text/plain

I'll also cast my vote in favour of TOC.

By the way, it would be helpful to me if the TOC was designed to work
with as generic as possible a GPS clock source, and depended as little
as possible on the specific TAC board sold by TAPR. A while ago, I
obtained a GPS-20, but the TAPR TAC kit was not yet available. I couldn't
wait, so I built a TAC equivalent. It has the same sort of outputs that
the TAPR TAC does, and I borrowed some parts of its design. I now have
a box that behaves almost identically to a TAC but which does not have
a TAPR board inside it.

I imagine that there are other people out there who have GPS timing
receivers with 1 PPS outputs that are not TACs, but who would be interested
in a TOC that is capable of being connected to their hardware.

        Dave

62. [TACGPS:621] Re: Where to put the antenna?

From: gregory.beat@mediaone.net (Gregory Beat)
Date: Sun, 7 Sep 1997 19:53:54 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <34134C61.77176A96@mediaone.net>
Rendered body type: text/plain

John Ackermann N8UR wrote:

> How much of the sky does the antenna need to see for reliable
> TAC use?

I have had the antenna on the bench, near the ceiling/roof (third
floor)and at the window. The window was usually provided the
best results.
Like Bill, on average I see from 2 to 6 "birds".
On rare occasions when I was running SHOWTIME, I would hear the
"no lock" - unreliable time beeping. It would usually only last
for a couple of
minutes before one would rise or come into view. [BTW, I have a
wonderful
church steeple that is across the street that does a wonderful
job blocking
in the NE up to about 40 degrees elevation]

> I'm debating whether it's worth the effort (and increased
> feedline loss) to
> mount the GPS antenna up on my tower above the roofline, where
> it will have a
> clear shot for 180 degrees (west through north to east), and a
> shot through

> trees for the other 180 degrees. Alternatively, I can just
> stick the antenna
> out the basement window, where it will see pretty well from
> north through
> east, and then through trees (below 45 degree elevation,
> anyway) from east
> through south.

I am using the Motorola "hockey puck" (built in LNA) and this
made all thedifference compared to the simple 'L' band patch
antenna with no LNA.

If you are going to mount it outside and up a tower, (if it was
me)
I would probably choose one of the marine style antennas, like
the
Trimble. Maybe someone would suggest the best style for regular
outdoor use and for harsh (salt water, snow belt etc.)
environments/climates.

G. Beat
W9GB

63. [TACGPS:622] Re: GPS-30PC Offer Extension

From: "Kenneth R. Goodwin, Jr." <kgoodwin@draper.com>
Date: Sun, 7 Sep 1997 22:39:42 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.2.32.19970907223239.006a0480@minnie.jsc.draper.com>
Rendered body type: text/plain

I haven't seen much technical info on the GPS-30PC
so a few "novice" questions:
1. I'm interested in APRS. Will this unit work for that
mode (I remember the one serial port disallows DGPS).
2. Does stand-alone software exist for the unit, either
as part of the shipment or shareware, i.e., can I use the
unit with a power supply and a laptop? Or in another vein,
how do I initially check out the unit to ascertain if
it is dead on arrival?

(I also have read the TAPR constraints on the offer which
sounds more than fair.) 73, Ken K5RG

64. [TACGPS:623] RE: Latest TAC32

From: clark@tomcat.gsfc.nasa.gov
Date: Sun, 7 Sep 1997 22:46:56 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <36369@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Rick -- I'll pull down the release of the day. Noted another wierdo.
Sometimes when a satellite is not being tracked, the Eb/No shows as
4264. Since 1/r**2 from the smallest subatomic particle to the size
of the universe is only 1o**80 = 1600 dB, I think your calculation is
wrong ;<}

Tom

65. [TACGPS:624] RE: Latest TAC32

From: Dave Deets <dave@deets.com>
Date: Mon, 8 Sep 1997 00:04:15 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <2.2.32.19970908045929.006bcb00@popd.ix.netcom.com>
Rendered body type: text/plain

I'm using a Garmin GPS II with TAC32 1.0.6. The only clock readout that I
get is the bold readout at the top & it is the PC time at program start.
Also at the bottom of the bar graphs it reads "8 satellites visible 0
tracked" the bar graph shows 5 or 6 visible & so does my GPS. Any suggestions?

Thanks
Dave Deets KE6HFA
dave@deets.com

66. [TACGPS:625] Re: Reply to Henk Uijterwaal

From: "Henk Uijterwaal (RIPE-NCC)" <henk@ripe.net>
Date: Mon, 8 Sep 1997 07:00:53 -0500 (CDT)
To: tacgps@tapr.org

Message-ID: <Pine.SUN.3.95.970908133743.22381D-100000@ncc.ripe.net>
Rendered body type: text/plain

On Sat, 6 Sep 1997, Tom Clark (W3IWI) wrote:
> Henk Uijterwaal (RIPE-NCC) wrote:

> > BTW. We also have Motorola Oncore Evaluation kit. I connected that
> > one to the port where the TAPR is sitting and ran the program
> > again. It then does produce sensible output. However, this unit
> > doesn't give a 1 pps output to the computer (the CD pin in the
> > connector
> > that goes into the computer isn't even connected to anything). Also,
> > the unit works fine with the SHOWTIME program. So,
> > I'm now reasonably sure that the 1pps interferes with the program
> > reading the com port. The question remains how do I get around this?

> Regarding hardware changes to the EVAL kit, you will find what you need
> to do to make a "fake TAC" documented on my aleph ftp site: Fetch URL

>   ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/emulate.txt
> and ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/emulate.zip

> The .txt file describes the modification, while the .zip file also has
> a schematic drawing in it.

Thanks for the pointer but (I guess I didn't make myself too clear)
I have exactly the opposite problem. I don't want to convert the Motorola
into a TAC, I just want to talk under Unix (BSD, though Linux for a start
would be fine too) to the TAC.

I have a piece of code that sets up the com port, sends a command string
(@@Cj(<cr><lf>) to the Motorola or TAC, and then starts reading from the
com port. I'd expect to get a string back that starts with @@. When
I do this with the Motorola, this is indeed the case. With the TAC
however, I get something back but it doesn't even contain @@.

Now, when I look at the cables, then the Motorola cable only has ground,
transmit and receive connected. The TAC has a 1 pps on one of the
other lines.

This seems to suggest that the program that sets up the com port is
ok, but that the 1 PPS interferes with reading from the port. What
I'm looking for is a way to get around this. It has been
suggested on this list to use the kernel routine ioctl() but,
after an afternoon of reading man pages and looking at kernel
sources, I haven't figured out with which parameters I have to call
ioctl.

I know that it must be possible to do this, after all, showtime
works fine and it does use both the 1 pps as well as the data from
the tac.

Henk.

Henk Uijterwaal   Email: henk.uijterwaal@ripe.net
RIPE Network Coordination Centre   WWW: http://www.ripe.net/home/henk
Singel 258   Phone: +31.20.5354414
1016 AB Amsterdam   Fax: +31.20.5354445
The Netherlands   Home: +31.20.6651962

%DCL-E-NOCFFE, unable to locate coffee - keyboard input suspended.

67. [TACGPS:626] More TAC trouble....

From: "Henk Uijterwaal (RIPE-NCC)" <henk@ripe.net>
Date: Tue, 9 Sep 1997 07:02:50 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <Pine.SUN.3.95.970909134739.20179C-100000@ncc.ripe.net>
Rendered body type: text/plain

Hi,

Well, I finally found why the data that I got from the TAC was completely
unreadable: believe it or not, I was reading at the wrong baud rate :-(
This is actually documented in one of the doc-file: Showtime uses 9600
baud to send data to the TAC, then switches to 4800 NMEA format for normal
operations.

And, the way I ran my program was to use showtime to check that TAC

was working, then switch to Unix and try to talk to the box at 9600
baud. Anyway, if I "listen" to the box at 4800 baud, I get a bunch of
$GPxxx,,,,, strings every second with the correct time and position.

Now, for my application I have to have full control of the TAC and want to
use the Motorola format for that. Does anybody know how to switch the TAC
back to 9600 baud and Motorola format? There should be a NMEA command for
that, but I couldn't find that in the xerox of the manual that came with
the TAC. Can anybody with a full manual have a look in his copy?

Other than that, I guess it's a matter of setting up the port at 4800,
send it the right string and set the port up again at 9600.

Henk

Henk Uijterwaal   Email: henk.uijterwaal@ripe.net
RIPE Network Coordination Centre   WWW: http://www.ripe.net/home/henk
Singel 258   Phone: +31.20.5354414
1016 AB Amsterdam   Fax: +31.20.5354445
The Netherlands   Home: +31.20.6651962

%DCL-E-NOCFFE, unable to locate coffee - keyboard input suspended.

68. [TACGPS:627] RE: [tacgps:607] Re: Comments after arriving back home

From: "John K. Pringle" <jpringle@gte.net>
Date: Tue, 9 Sep 1997 08:45:17 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCBD04.16C8ABA0@1Cust44.max10.orlando.fl.ms.uu.net>
Rendered body type: multipart/mixed

[No readable text body. See the preserved original monthly archive.]
[Inline non-text content: multipart/mixed; 495 bytes]

69. [TACGPS:628] Which way is up ?

From: gregory.beat@mediaone.net (Gregory Beat)
Date: Tue, 9 Sep 1997 15:55:23 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3415B55B.9A152D1F@mediaone.net>
Rendered body type: text/plain

On 6/9/97 Tom Clark wrote:

>I'm torn between the desire to make SHOWTIME be more
bullet-proof and the desire to get back to
>working on the TOC (TAC Oscillator Controller-a TAC-2 expansion
board that will make a nearly
>Rubidium quality frequency standard with stability in the 1:10e9
to 1:10e10 level). I'd appreciate
>your inputs on the priorities.

Tom, as long as you don't mind Richard Hambly, Henk Uijterwaal or
I asking questions as we
port the SHOWTIME functionality to other operating systems (32
bit Windows & Linux),
I would go ahead with the TOC step.

G. Beat
W9GB

70. [TACGPS:629] TAC32 Version 1.0.7 now available

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Tue, 9 Sep 1997 21:31:47 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCBD6F.E1FE7320.rick@cnssys.com>
Rendered body type: text/plain

Tom, Greg,

TAC32 Version 1.0.7 now available for testing at http://www.cnssys.com/tac32.

This version has sound effects which can be turned on/off from the Data/Sound Effects menu item.

Rick
WB2TNL

71. [TACGPS:630] RE: Latest TAC32

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Tue, 9 Sep 1997 21:39:04 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCBD70.4DCD0580.rick@cnssys.com>
Rendered body type: text/plain

Tom,

I assume this was in Mot Bin mode. I have been looking for this but I
haven't seen it. I'll keep this bug report open until I can track it down.

Rick

-----Original Message-----
From: clark@tomcat.gsfc.nasa.gov [SMTP:clark@tomcat.gsfc.nasa.gov]
Sent: Sunday, September 07, 1997 11:47 PM
To: tacgps@tapr.org
Subject: [TACGPS:623] RE: Latest TAC32

Rick -- I'll pull down the release of the day. Noted another wierdo.
Sometimes when a satellite is not being tracked, the Eb/No shows as
4264. Since 1/r**2 from the smallest subatomic particle to the size
of the universe is only 1o**80 = 1600 dB, I think your calculation is
wrong ;<}

Tom

72. [TACGPS:631] RE: Latest TAC32

From: gregory.beat@mediaone.net (Gregory Beat)
Date: Tue, 9 Sep 1997 22:20:05 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <34160FD7.F33520C1@mediaone.net>
Rendered body type: text/plain

Rick,

>From Tom's original report:

> -----Original Message-----
> From: clark@tomcat.gsfc.nasa.gov
> [SMTP:clark@tomcat.gsfc.nasa.gov]
> Sent: Sunday, September 07, 1997 11:47 PM
> To: tacgps@tapr.org
> Subject: [TACGPS:623] RE: Latest TAC32
>
> Rick -- I'll pull down the release of the day. Noted another
> wierdo.
> Sometimes when a satellite is not being tracked, the Eb/No
> shows as
> 4264. Since 1/r**2 from the smallest subatomic particle to the
> size
> of the universe is only 1o**80 = 1600 dB, I think your
> calculation is
> wrong ;<}
>
> Tom

Rick, I have seen on at least three occasions the same "weird"
Eb/No number
that Tom is reporting. [I believe I was in Mot Bin mode].
I seem to observe it at my location at the beginning or end of
"acquisition"
low elevation [it eventually rights itself].

On your latest, the latency has changed (sound effects?). Instead
of
35 to 40 which was typical for my setup, it now runs
aorund 185 to 190.

The Mot Bin always graphs a maximum of 8 satellites, while
Mot NMEA will show (graph) the 9 or 10 reported visible at the
bottom.

I like the feature of resorting the graph based on which "radio"
button
[PRN, El, Azm, Eb/No] that you push. Did Tom see that. I use
it to "map" my Azm blind spots.

I have also noted my QTH altitude(GPS) had been reported as low

as 6 meters (sea side?)
to 300 meters in altitude(GPS) in one evening. Now I know Tom is
working
with the geologists on occasion, but I do not think there was a
subsiding event
near Lake Michigan (of course, that may have been the switch you
installed
to change my frame of reference, what was that new value of 'c'
for the
speed of light that you used?)

Greg

73. [TACGPS:632] Re: TAC32 Version 1.0.7

From: gregory.beat@mediaone.net (Gregory Beat)
Date: Tue, 9 Sep 1997 22:20:11 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <34161082.42280D7E@mediaone.net>
Rendered body type: text/plain

Richard M. Hambly wrote:

> Tom, Greg,
>
> TAC32 Version 1.0.7 now available for testing at
> http://www.cnssys.com/tac32.
>
> This version has sound effects which can be turned on/off from
> the Data/Sound Effects menu item.

I just confirmed that the sound effect "ON" adds to the displyed
latency.Turning it "OFF" restores to anticipated latency numbers.

Greg
W9GB

74. [TACGPS:633] TAC32 Suggestion #1

From: gregory.beat@mediaone.net (Gregory Beat)
Date: Tue, 9 Sep 1997 22:30:59 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <34161288.496B59D4@mediaone.net>
Rendered body type: text/plain

Rick,

I will start with the easy request. Let's expand upon status bar
you have created
at the bottom of the window [you already have your flashing red
cursor
in the bottom right corner].

Status Bar would consist of 6 fields, from left to right
[value options in brackets]

Mode [Mot Bin, Mot NMEA, Garmin?]
Time [UTC (+ or -) xx] where xx is the offset from the Win95
time/date function call
Local Time [EST, EDT, CST, CDT, etc] I believe that this is also
a Win95 function call
Speed of computer connection to GPS reciver [4800, 9600, others]
Com port being used [COM1, COM2, COM3, etc.]
Flashing red cursor [1 pps visual]

That is all for right now. The nice part is that you already
have the
toggle built into the View selction from the Top Menu bar.

Greg

75. [TACGPS:634] Another Fix - Version 1.0.8 is out

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Tue, 9 Sep 1997 23:19:06 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCBD7E.363C9440.rick@cnssys.com>
Rendered body type: text/plain

Tom,

I found and corrected this problem. In a recent release I added a check
for the various reasons why a satellite might not be navigating and decided
to replace EbNo with -1 through -7 and -9 as tags to those reason codes.
 Unfortunately, the EbNo field was defined as an unsigned integer so the
small negative numbers looked like large positive ones.

I also found an error with the new time ticks at the top of the minute. I
was looking at the PC clock which can show two "0" seconds in a row (i.e.
03:03:00.000, 03:03:00.999). I now look to the GPS clock for this so the
"double beep" will not happen again. With luck I caught this before you
downloaded version 1.0.7.

Rick

-----Original Message-----
From: Richard M. Hambly [SMTP:rick@cnssys.com]
Sent: Tuesday, September 09, 1997 10:33 PM
To: 'tacgps@tapr.org'
Subject: RE: [TACGPS:623] RE: Latest TAC32

Tom,

I assume this was in Mot Bin mode. I have been looking for this but I
haven't seen it. I'll keep this bug report open until I can track it down.

Rick

-----Original Message-----
From: clark@tomcat.gsfc.nasa.gov [SMTP:clark@tomcat.gsfc.nasa.gov]
Sent: Sunday, September 07, 1997 11:47 PM
To: tacgps@tapr.org
Subject: [TACGPS:623] RE: Latest TAC32

Rick -- I'll pull down the release of the day. Noted another wierdo.
Sometimes when a satellite is not being tracked, the Eb/No shows as
4264. Since 1/r**2 from the smallest subatomic particle to the size
of the universe is only 1o**80 = 1600 dB, I think your calculation is
wrong ;<}

Tom

76. [TACGPS:635] RE: Latest TAC32

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Tue, 9 Sep 1997 23:33:55 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCBD80.B498AF20.rick@cnssys.com>
Rendered body type: text/plain

Greg,

> ... "weird" Eb/No number ...

FIXED in V1.0.8.

> ... latency [was] 35 to 40 {is now] 185 to 190.

WOW. My machine runs latency of -1 typically. My laptop runs at about
-40.
Please describe your hardware for me.
I may be making an error in the order of critical operations. I'll look
into this.

> Mot Bin always graphs max 8 satellites ... Mot NMEA ... 9 or 10

Motorola, in their infinite wisdom, chose to limit the information to the
best 8 satellites in their proprietary binary format. The binary format is
much better than the NMEA in many other respects, however.

> I like the feature of resorting the graph based on which "radio"
> button [PRN, El, Azm, Eb/No] that you push.

Thanks. That was Tom's idea and it was no easy task, I'll tell you!

> ...my QTH altitude(GPS) had been reported as low as 6 meters (sea side?)
> to 300 meters in altitude(GPS) in one evening.

This is perfectly normal during non-differentially corrected receivers with

Selective Availability (SA) turned on by DoD and with the wide variations in DOPs. The vertical is about 1.5 times more sensitive to these errors than the horizontal plus you are personally more sensitive to this variation than to the same errors in a latitude or longitude. The current "guarantees" are +-100meters 95% of the time and +-300meters essentially 100% of the time horizontally and 1.5 times that vertically.

TAC32 will soon have the much needed self-survey feature so you can average these thing out (yes, they are generally 0-mean, gaussian distributed errors). Then you will be able to lock the GPS receiver in place at the surveyed location so that your time reference will get MUCH better.

Greg

77. [TACGPS:636] Trimble: new GPS Clock

From: Mike Cheponis <mac@wireless.com> (by way of Greg Jones, Wd5IVD)
Date: Thu, 11 Sep 1997 08:58:39 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <l03102805b03d5fc8b9e7@[206.133.248.23]>
Rendered body type: text/plain

Trimble Introduces New GPS Clock for Precise Timing

DALLAS, Sept. 10 /PRNewswire/ - Anticipating the continued growth of the wireless voice and data infrastructure, Trimble (Nasdaq: TRMB) introduced today at the Personal Communications Showcase (PCS) '97 - Thunderbolt(TM), a GPS clock for precise synchronization of wireless networks. Each wireless system requires its own unique slice of the radio spectrum. In order to optimize its assigned spectrum across very large geographical areas, wireless systems must be carefully timed and synchronized. Trimble's Thunderbolt takes GPS disciplined clocks to a new level of integration that provides a simple, cost effective and high performance solution.

GPS clocks provide superior performance for precise timing applications such as maintaining tough Code Division Multiple Access (CDMA) holdover specifications, Enhanced 911 (E911) location positioning using Time Difference of Arrival (TDOA), and maximizing bandwidth for wireless local loops. Thunderbolt captures the features that these applications require, such as 10 MHz reference signals, a 1 PPS and a self survey mode that provides "plug-in" integration.

GPS is used to discipline or calibrate the oscillator to remove small biases in the frequency. By eliminating a quartz oscillator's natural tendency to drift, the unit gives a long term stability that rivals atomic clocks. Thunderbolt takes this process to the next step by combining the GPS receiver control circuitry and high-quality ovenized oscillator on a single board, allowing the removal of duplicate parts and tricky steering algorithms that rely on comparing 1 PPS. Thunderbolt can also operate with Trimble's Bullet II in hostile RF-jamming environments often encountered at wireless network transmitter sites.

According to Peter Kuykendall, Trimble's Product Manager for Software & Component Technologies, "Wireless providers around the globe are in a phase of launching new data and voice services, all of which require sophisticated management of bandwidth allocation. Thunderbolt's unprecedented level of integration allows designers to deliver products which maximize communications infrastructure investments."

The product is expected to be available within 8 to 12 weeks after receipt of order.

About Trimble

Trimble is a world leader in the emerging commercial markets for GPS satellite-based navigation, positioning and communication data products. The company holds more U.S. patents on GPS and related technology than any other organization. These products are sold worldwide for diverse applications including land and hydrographic surveying; mapping/GIS data acquisition; agriculture; military; general, corporate and commercial aviation; marine navigation; vehicle tracking and communications; and mobile GPS. The company also manufactures and sells GPS engines for the OEM market. Founded in 1978 and located in Sunnyvale, CA, Trimble has been a leader in providing GPS solutions since 1984.

```
    For an interactive look at company news and products, visit
  Trimble's site on the World Wide Web at http://www.trimble.com.
  SOURCE  Trimble

        -0-                             09/10/97
        /CONTACT:  Lea Ann McNabb of Trimble, 408-481-7808, or
  leaann_mcnabbtrimble.com/
        (TRMB)

  CO:  Trimble
  ST:  California, Texas
  IN:  CPR
  SU:  PDT
```

78. [TACGPS:637] QST: Configuration FreeBSD with PPS

From: Olaf Kolkman <OKolkman@pi.net>
Date: Thu, 11 Sep 1997 12:25:23 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <341828D8.41C67EA6@ripe.net>
Rendered body type: text/plain

Keywords: xntpd 3.90, PPS, FreeBSD 2.2

Hello,

I'm trying to get the following configuration to work:

- FreeBSD 2.2 compiled with PPS_SYNC as an option in the kernel
configuration file.

- A PPS signal from a GPS clock (TAC2) on the DCD of serial port one.
(/dev/pps0 -> /dev/ttyd0).

I do not (yet) want to use any timecoding information. So only like to
use the PPS and external ntp-peers to drive the kernels ppl.

Here is the ntp.conf I use:

```
        enable pps
        server 127.127.22.0
        fudge  127.127.22.0 flag3 1
        server 193.78.241.12  prefer
        server 193.78.241.14
        server 193.78.241.16
        server 193.0.0.130
        server 193.0.0.193

        logconfig =all
        driftfile /var/db/ntp.drift
        statsdir /var/log/xntp/
        statistics loopstats peerstats clockstats
        logfile /var/log/xntp/logfile
```

The log output is:

```
./xntpd
bash-2.00# Sep 11 19:02:40 pijp xntpd[5192]: xntpd 3-5.90 Thu Sep 11
18:28:52 CEST 1997 (15)
Sep 11 19:02:40 pijp xntpd[5192]: tickadj = 5, tick = 10000, tvu_maxslew
= 495, est. hz = 100
Sep 11 19:02:40 pijp xntpd[5192]: using kernel phase-lock loop 0041
Sep 11 19:02:40 pijp xntpd[5192]: logging to file /var/log/xntp/logfile
11 Sep 19:02:40 xntpd[5192]: system event 'event_restart' (0x01) status
'sync_alarm, sync_unspec, 1 event, event_unspec' (0xc010)
11 Sep 19:02:42 xntpd[5192]: peer 193.78.241.12 event 'event_reach'
(0x84) status 'reach, conf, 1 event, event_reach' (0x9014)
11 Sep 19:02:43 xntpd[5192]: peer 193.78.241.14 event 'event_reach'
(0x84) status 'reach, conf, 1 event, event_reach' (0x9014)
11 Sep 19:02:44 xntpd[5192]: peer 193.78.241.16 event 'event_reach'
(0x84) status 'reach, conf, 1 event, event_reach' (0x9014)
11 Sep 19:02:45 xntpd[5192]: peer 193.0.0.130 event 'event_reach' (0x84)
status 'reach, conf, 1 event, event_reach' (0x9014)
11 Sep 19:02:46 xntpd[5192]: peer 193.0.0.193 event 'event_reach' (0x84)
status 'reach, conf, 1 event, event_reach' (0x9014)
```

```
11 Sep 19:04:49 xntpd[5192]: clock ATOM_PPS(0) fault 'clk_fault' (0x03)
11 Sep 19:06:58 xntpd[5192]: system event 'event_peer/strat_chg' (0x04)
status 'sync_alarm, sync_ntp, 2 events, event_restart' (0xc621)
11 Sep 19:06:58 xntpd[5192]: synchronized to 193.78.241.12, stratum=1
11 Sep 19:06:58 xntpd[5192]: kernel pll status change 8f
...


Somehow something generates faults on ATOM_PPS and I do not know what
goes wrong. The error message (  ATOM_PPS(0) fault 'clk_fault' (0x03) )
is generated during a routine called atom_poll in refclock_atom.c but I
do not understand what goes wrong exactly.

Concrete questions: If you have a working FreeBSD xntp system with
PPS_SYNC configured please send me your kernel configuration file, your
ntp configuration file and any patches I might need to get the PPS
working.

If you know what the error means please tell me as well.

If you can tell me how a log file should look when PPS is used (using
TIOCDCTIMESTAMPs) so I can check that we actually do get a PPS you would
also be most helpfull.



Please post the answer to this forum and CC me on OKolkman@ripe.net


Cheers,

Olaf Kolkman
```

79. [TACGPS:638] RE: Latest TAC32

```
From: gregory.beat@mediaone.net (Gregory Beat)
Date: Thu, 11 Sep 1997 18:03:46 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <34187666.4B3D2DBE@mediaone.net>
Rendered body type: text/plain
```

```
Richard M. Hambly wrote:

> "weird" Eb/No number ...
>
> FIXED in V1.0.8.

I have seen the -7 in the Eb/No on a couple occasionslast night
(Wednesday).

> > ... latency [was] 35 to 40 {is now] 185 to 190.
>
> WOW.  My machine runs latency of -1 typically.  My laptop runs
> at about
> -40.
> Please describe your hardware for me.
> I may be making an error in the order of critical operations.
> I'll look
> into this.

Motorola "hockey puck" antenna (now sitting in window sill)6
meters RG-58 cable to receiver [Tom has correction in Showtme for
length, etc]
Oncore VP 8 channel [TAPR model] attached to
TAC-2 board with "Gold" capacitor option
486 100 MHz 32 Mb memory running Windows 95, all latest patches &
service releases

I use the AccuSet 4.1 package and update the computer's internal
clock on a weekly basis
with the USNO clock in Maryland.  Based on the past sixty day
base line, my internal clock
accuracy is + 1.71 sec/day [My computer clock runs a bit fast].

> > Mot Bin always graphs max 8 satellites ... Mot NMEA ... 9 or
> 10
>
> Motorola, in their infinite wisdom, chose to limit the
> information to the
> best 8 satellites in their proprietary binary format.  The
```

> binary format is
> much better than the NMEA in many other respects, however.

This evening I have noted that in Motorola Binary mode,the bottom
right status line reported 9 visible, 5 tracked ---
and incremeted to 6 as I watched.
but only 6 satellites [no change during status line increment]
were shown on the tracking graph....
the other two (to make 8) were all zeroes.

Raw data view shows that I am indeed in Mot binary mode.
Am I a 6 channel receiver now?

I will cycle TAC32 and if that does not work, Oncore/ TAC-2 as
well.

Greg

80. [TACGPS:639] Re: Trimble: new GPS Clock

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Fri, 12 Sep 1997 13:53:39 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19970912145058.0068c6ac@tomcat>
Rendered body type: text/plain

regarding this message .....
>   Trimble Introduces New GPS Clock for Precise Timing
>
>   DALLAS, Sept. 10 /PRNewswire/ - Anticipating the continued
> growth of the wireless voice and data infrastructure, Trimble
> (Nasdaq: TRMB) introduced today at the Personal Communications
> Showcase (PCS) '97 - Thunderbolt(TM), a GPS clock for precise
> synchronization of wireless networks. Each wireless system
> requires its own unique slice of the radio spectrum. In order to
> optimize its assigned spectrum across very large geographical
> areas, wireless systems must be carefully timed and synchronized.
> Trimble's Thunderbolt takes GPS disciplined clocks to a new level
> of integration that provides a simple, cost effective and high
> performance solution.   .... blah blah blah .....

The press release shows the trimble.com web site as a reference. However,
the web site shows no reference to this, including the excite search
engine. The press release had the predictable platitudes. Does anyone
have any real factoids about Thunderbolt?

Tom

81. [TACGPS:640] Re: Trimble: new GPS Clock

From: Lyle Johnson <lylej@azstarnet.com>
Date: Fri, 12 Sep 1997 19:59:17 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19970912174617.0072a644@pop.azstarnet.com>
Rendered body type: text/plain

Tom et al,

I'll be at ION next week. If I can find out anything (and if Trimble is
still speaking to me :-) I will see what I can get.

Lyle

At 01:53 PM 9/12/97 -0500, you wrote:
>regarding this message .....
>>   Trimble Introduces New GPS Clock for Precise Timing
>>
>>   DALLAS, Sept. 10 /PRNewswire/ - Anticipating the continued
>> growth of the wireless voice and data infrastructure, Trimble
>> (Nasdaq: TRMB) introduced today at the Personal Communications
>> Showcase (PCS) '97 - Thunderbolt(TM), a GPS clock for precise
>> synchronization of wireless networks. Each wireless system
>> requires its own unique slice of the radio spectrum. In order to
>> optimize its assigned spectrum across very large geographical
>> areas, wireless systems must be carefully timed and synchronized.
>> Trimble's Thunderbolt takes GPS disciplined clocks to a new level
>> of integration that provides a simple, cost effective and high
>> performance solution.   .... blah blah blah .....
>
>The press release shows the trimble.com web site as a reference. However,
>the web site shows no reference to this, including the excite search

>engine. The press release had the predictable platitudes. Does anyone
>have any real factoids about Thunderbolt?
>
>Tom
>
>
>

82. [TACGPS:641] Re: Trimble: new GPS Clock

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Sat, 13 Sep 1997 00:57:44 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19970913045034.0068ff14@tomcat>
Rendered body type: text/plain

At 19:59 09/12/97 -0500, Lyle wrote:
>Tom et al,
>
>I'll be at ION next week. If I can find out anything (and if Trimble is
>still speaking to me :-) I will see what I can get.
>
>Lyle

Unfortunately, I won't be there. Be sure to give us a core-dump on what
you see that's new & great! And pse report if anyone is talking about
our TAC exploits.

Tom

83. [TACGPS:642] RE: TAC32 -

From: Allen Schaeffer <ascha@erols.com>
Date: Sat, 13 Sep 1997 21:25:49 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <341B4AF3.EF94CF@erols.com>
Rendered body type: text/plain

Rick:

Sorry for the late reply - I've been on vacation & had no net access. I have
downloaded TAC32 1.0.8 and have tried it for a few minutes. The time display
is still not updated beyond the initial time at startup. All other time
displays are blank. The sound of clock "ticks" is present as is the blinking
"heartbeat".
Satellites received data appears to be present as well as signal strength. No
location data is displayed. I am able to observe real time data, so the baud
rate problem appears to have been corrected.

I will continue to observe the operation of this version and hopefully will now
be available if you have questions regarding the Garmin 20.

- Allen WA3ZYM

84. [TACGPS:643] RE: TAC32 -

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Sat, 13 Sep 1997 22:24:00 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19970914021811.00694014@tomcat>
Rendered body type: text/plain

At 21:25 09/13/97 -0500, WA3ZYM wrote:
>Rick:
>
>Sorry for the late reply - I've been on vacation & had no net access. I have
>downloaded TAC32 1.0.8 and have tried it for a few minutes. The time display
>is still not updated beyond the initial time at startup. All other time
>displays are blank. The sound of clock "ticks" is present as is the blinking
>"heartbeat".

Make sure to try [EDIT] [SET SERIAL PORT] and select the proper COM# port,
then try [SEARCH] and/or [GARMIN]

Tom

85. [TACGPS:644] Re: Garmin vs. Motorola, Computerless operation

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Sun, 14 Sep 1997 01:03:28 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19970914031313.006963f8@tomcat>

Rendered body type: text/plain

At 14:21 09/07/97 -0500, Gordon Uber wrote:
>A friend, Paul Hopkins, is trying to decide between the Garmin
>and Motorola GPS engines from TAPR. He wants a 1 PPS timebase
>precise to better than 100 microseconds for timing high-accuracy
>mechanical pendulum clocks.
>
>1. Which of the two choices provides more reliable operation?

Hi Gordon -- it's been a while since we corresponded. Lack of time has
diminshed my presence on sci.geo.satellite.nav.

Sorry to be slow in answering. My travel schedule this summer has been
horrendous; I've been out of the country more than half the time since May
with trips to UK, Italy, China, Alaska & Brazil.

On the Garmin GPS-20 vs ONCORE question -- either gives the 100 usec
accuracy with no problem. The GPS-20 is rather balky in locking up and
I would not recommend it for anyone who needs high reliability. The
ONCORE is a MUCH!! more robust receiver.

With the GPS-20 there is the annoyance that the user needs to make a very
annoying 5-wire cable for the receiver which has driven some to distraction.
The ONCORE simply plugs into my TAC-2 circuit board.

The software we have to support the receivers (my old SHOWTIME and Rick's
new TAC32) is taylored to the ONCORE. The GPS-20 apparently works OK, but
you have a lot less flexibility.

So I summarize -- for a high quality application, use the ONCORE and pay the
extra ~$100. If you want a "tekkie toy", the Garmin is neat.

>2. Can he set up and use both of these without Showtime and
>without a computer if he only needs the 1 PPS?

SHOWTIME/TAC32 are needed only for setup and display. When I built my
original TACs, some folks said "this isn't a clock -- it doesn't display
the time". So rather than building a hardware display, I wrote SHOWTIME to
turn your PC into a digital clock. But as long as power and antenna are
connected, the 1PPS signals come out independent of the computer.

>3. Should he use one of these directly without the TAC-2 kit?

I did the TAC-2 as a lab-quality way to accommodate any of several timing
receivers with a standardized interface. The ONCORE requires some RS232
drivers, you need a regulated power supply and you may want to buffer the
hardware 1PPS signals -- which is what the TAC-2 does. TAPR (thru Doug
McKinney) has a cheaper ONCORE interface board, as well as a cheaper GPS-20
interface board that will probably be adequate. In addition, a do-it-
yourselfer can easily make a TAC clone with documentation on my aleph FTP
site at URL:

    ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/emulate.txt

(and the file emulate.zip has postscript schematics to supplement the text
info).

>Please send your replies to me or the list, since he has no Internet
>connection.
>
>Thanks.
>
>Gordon
>
>--
>| XII | Gordon T. Uber, 3790 El Camino Real, Suite 142
>| XI | Palo Alto, CA 94306-3314, email: gordon@ubr.com
>| X \   /| CLOCKS and TIME: http://www.ubr.com/clocks/
>| IX   \ / | Reynen & Uber WebDesign: http://www.ubr.com/rey&ubr

It's been a while since I surfed your "clocks" web site. I see that the
reference you have for the TAC points to the SETI league. You might update
it to point to   http://www.tapr.org/tapr/html/tac2.html and weave in a
couple of other references to what we are doing.

Regards, Tom

86. [TACGPS:645] Re: Antenna location for fixed TAC system?

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Sun, 14 Sep 1997 01:03:45 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19970914031837.00688a00@tomcat>
Rendered body type: text/plain

At 18:34 09/07/97 -0500, John, N8UR (surprised to see the new call!) wrote:
>How much of the sky does the antenna need to see for reliable TAC use?
>
>I'm debating whether it's worth the effort (and increased feedline loss) to
>mount the GPS antenna up on my tower above the roofline, where it will
have a
>clear shot for 180 degrees (west through north to east), and a shot through
>trees for the other 180 degrees. Alternatively, I can just stick the
antenna
>out the basement window, where it will see pretty well from north through
>east, and then through trees (below 45 degree elevation, anyway) from east
>through south.

For timing, it is the high elevation satellites that are most important.
In terms of what part of the sky to see, remember that the GPS satellites
are in 55 degree inclination orbits. At mid northerly latitudes, this means
that there is a "hole" with no satellites in it to your north. If you have
to accept plackage, try putting your antenna so that obstructions are north
+/- 60 degrees of azimuth or so.

73, Tom

87. [TACGPS:646] Low-Cost GPS antenna

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Sun, 14 Sep 1997 01:03:50 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19970914033537.00688a00@tomcat>
Rendered body type: text/plain

This week I spent some time working on a foolproof do-it-yourself
low-cost GPS antenna. I'll have it to show at the TAPR/ARRL DCC in
October in Baltimore.

The antenna is a 2-turn helix. The helix is wound on a disposable
Yoplait Yoghurt cup (picked up free during breakfast on a NorthWest
Airlines flight), using adhesive-backed copper-foil tape. The helix
feeds a MiniCircuits ERA-3 MMIC amplifier (cost < $2). The MMIC's
input coupling capacitor is integrated into the antenna matching
section. The simple matching section (copper foil tape + scotch tape)
achieves > -20 dB return loss matching to 50 ohms. All these parts
mount on a ~3" diameter piece of unetched circuit board. The only
other components are one resistor and an SMA connector. I recon the
total parts price to be < $5. I can put one together in 1-2 hours
needing only a soldering iron, some super-glue and RTV (now that I've
figured out the dimensions).

The great thing about a helix is that it is a broad-band antenna and
hence dimensions are not at all critical. The antenna has about a 60
degree field of view, lacking a bit of sensitivity at low elevation
angles. Hooking it up to a Garmin GPSII+, it significantly outperforms
the Garmin's normal antenna (the "S-meter" bars on the LCD are pinned
for some satellites) even when fed thru 50' of coax.

If there is interest, I'll try to pull together some sketches to be
available at the DCC. I'd post some photos, but unfortunately my digital
camera was stolen (along with my laptop) during a recent trip to Brazil.

The hard-to-get part is the MiniCircuits ERA-3 MMIC amplifier since
MiniCircuits has a $50 minimum order. If I hear of significant interest,
I'll order a batch and have them for sale.

73 de Tom, W3IWI

88. [TACGPS:647] Oncore GPS PPS

From: Bill Broadley <bill@math.ucdavis.edu>
Date: Sun, 14 Sep 1997 06:35:53 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199709141131.EAA23113@proto.math.ucdavis.edu>
Rendered body type: text/plain

Hello all,
        I'm trying to get Linux to use the PPS (pulse per second) to
trip the clock via the DCD pin.

Anyone know the characteristic of the PPS signal when it's NOT in position hold mode? In position hold mode I believe it's +/- 50 ns onset, and +/- 1 ms decay.

I'm getting about a 500 us jitter which seems kinda excessive. I'm hoping that setting position hold is the problem, and not a software problem with the linux PPS kernel handling.

Anyone know if it's possible to put the Oncore VP into position hold mode from NMEA mode? How about the argument for the Motorola binary mode. It's @@At something is 0 turn it off, and 1 turns it on?

P.S. Yes I ordered the full Oncore VP manual, not here yet though.

--
Bill Broadley Bill@math.ucdavis.edu UCD Math Sys-Admin
Linux is great. http://math.ucdavis.edu/~bill PGP-ok

89. [TACGPS:648] RE: TAC32 -

From: Allen Schaeffer <ascha@erols.com>
Date: Sun, 14 Sep 1997 09:08:28 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <341BEE91.BC98E6A@erols.com>
Rendered body type: text/plain

Hi Tom,

Just wanted you and Rick to know that the time display in TAC32 using the Garmin 20 remains "frozen" (displays the time of startup of the program). This occurs if PC is checked under display and there is no display of time at all if UTC is checked. Under EDIT the correct Com port and receiver type is checked. After reading your description of development of Showtime, I wonder whether TAC32 is deriving the date/time info from $GPZDA instead of $GPRMC message?

-Allen (WA3ZYM)

Tom Clark (W3IWI) wrote:

> At 21:25 09/13/97 -0500, WA3ZYM wrote:
> >Rick:
> >
> >Sorry for the late reply - I've been on vacation & had no net access. I have
> >downloaded TAC32 1.0.8 and have tried it for a few minutes. The time display
> >is still not updated beyond the initial time at startup. All other time
> >displays are blank. The sound of clock "ticks" is present as is the blinking
> >"heartbeat".
>
> Make sure to try [EDIT] [SET SERIAL PORT] and select the proper COM# port,
> then try [SEARCH] and/or [GARMIN]
>
> Tom

90. [TACGPS:649] RE: TAC32 -

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sun, 14 Sep 1997 09:21:44 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCC0F7.483DDC40.rick@cnssys.com>
Rendered body type: text/plain

Allen,

This probably means I am not sending the Garmin the correct startup instructions. That's because I don't have one so I have been guessing based on what I think Showtime is doing. I'll look into it. Thanks for the feedback.

Rick

-----Original Message-----
From: Allen Schaeffer [SMTP:ascha@erols.com]
Sent: Sunday, September 14, 1997 10:08 AM
To: tacgps@tapr.org
Subject: [TACGPS:648] RE: TAC32 -

Hi Tom,

Just wanted you and Rick to know that the time display in TAC32 using the

Garmin
20 remains "frozen" (displays the time of startup of the program). This
occurs if
PC is checked under display and there is no display of time at all if UTC
is
checked. Under EDIT the correct Com port and receiver type is checked.
After
reading your description of development of Showtime, I wonder whether TAC32
is
deriving the date/time info from $GPZDA instead of $GPRMC message?

-Allen (WA3ZYM)

Tom Clark (W3IWI) wrote:

> At 21:25 09/13/97 -0500, WA3ZYM wrote:
> >Rick:
> >
> >Sorry for the late reply - I've been on vacation & had no net access. I
have
> >downloaded TAC32 1.0.8 and have tried it for a few minutes. The time
display
> >is still not updated beyond the initial time at startup. All other time
> >displays are blank. The sound of clock "ticks" is present as is the
blinking
> >"heartbeat".
>
> Make sure to try [EDIT] [SET SERIAL PORT] and select the proper COM#
port,
> then try [SEARCH] and/or [GARMIN]
>
> Tom

91. [TACGPS:650] Re: Low-Cost GPS antenna

From: Dave Martindale <davem@cs.ubc.ca>
Date: Sun, 14 Sep 1997 13:39:29 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <l03102002b041eab2271b@[198.162.38.159]>
Rendered body type: text/plain

>The antenna is a 2-turn helix. The helix is wound on a disposable
>Yoplait Yoghurt cup (picked up free during breakfast on a NorthWest
>Airlines flight), using adhesive-backed copper-foil tape. The helix
>feeds a MiniCircuits ERA-3 MMIC amplifier (cost < $2). The MMIC's
>input coupling capacitor is integrated into the antenna matching
>section. The simple matching section (copper foil tape + scotch tape)
>achieves > -20 dB return loss matching to 50 ohms.

That's great. Another material you might want to consider for the
helix "bobbin" is 2 inch ABS plastic drain pipe. The outer diameter
is 60.5 mm, making the circumference almost exactly 1 GPS wavelength.
And its's slightly sturdier than the yoghurt cup.

Have you tried a 2-turn helix without the MMIC amplifier? It might
work OK if the cable between antenna and GPS is kept very short (a
few feet). That would be adequate for some uses.

I once built an 8-turn passive helix for GPS, based on plans on
someone's web page. It had plenty of gain in the forward direction,
but overall was a terrible GPS antenna because of its narrow beamwidth.
A 2-turn helix wouldn't have that problem, yet might still have enough
gain for use without amplifier. I never got around to trying it.

I am interested in the design of your 50 ohm matching section as well.
I used the standard "feed at the circumference, gradually reduce the
slope of the final half-turn" technique, but have no test equipment to
check how well it worked.

Dave

92. [TACGPS:651] Re: Low-Cost GPS antenna

From: "Charles E. Heisler K3VDB" <cheisler@cyberia.com>
Date: Sun, 14 Sep 1997 15:58:01 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19970914165517.0069b04c@cyberia.com>
Rendered body type: text/plain

At 01:03 AM 9/14/97 -0500, W3IWI wrote:
+++++++++SNIP++++++++++++++
>If there is interest, I'll try to pull together some sketches to be
>available at the DCC. I'd post some photos, but unfortunately my digital
>camera was stolen (along with my laptop) during a recent trip to Brazil.
>
>The hard-to-get part is the MiniCircuits ERA-3 MMIC amplifier since
>MiniCircuits has a $50 minimum order. If I hear of significant interest,
>I'll order a batch and have them for sale.
>
>73 de Tom, W3IWI

        Please do Tom.
    Charlie K3VDB
>
>

93. [TACGPS:652] Re: Oncore GPS PPS

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Sun, 14 Sep 1997 23:10:29 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19970915030518.00690cc4@tomcat>
Rendered body type: text/plain

At 06:35 09/14/97 -0500, Bill Broadley wrote:
>
>Hello all,
>   I'm trying to get Linux to use the PPS (pulse per second) to
>trip the clock via the DCD pin.
>
>   Anyone know the characteristic of the PPS signal when it's
>NOT in position hold mode? In position hold mode I believe it's +/- 50 ns
>onset, and +/- 1 ms decay.

The characteristics of the ONCORE 1PPS signal are that the pulse is 0.2
seconds wide (i.e. a 20% duty cycle pulse train), independent of mode.
The "bare" oncore has rise/fall times of a few tens nsec, and with my
TAC-2 board, the 74AC04 1PPS output buffers have rise/fall times of ~2
nsec. The 200 msec pulse width is 200 msec +/- 50 nsec. This sounds
NOTHING like what you are reporting. Are you sure that you have a ground
connection to the point you are measuring?

>   I'm getting about a 500 us jitter which seems kinda excessive.
>I'm hoping that setting position hold is the problem, and not a software
>problem with the linux PPS kernel handling.

The ONCORE has never shown any more than +/- 200 nsec jitter. When in
the position determining mode, the pulse timing can be trusted to be
at worst a few hundred nsec from UTC. In the "zero-D" Position Hold
mode, the worst case you will ever see on any isolated pulse is in
the +/- 100 nsec range. There is an inherent "sawtooth" with a few
second periodicity with a peak-to-peak amplitude of 104 nsec but with
a zero-mean offset.

To see the timing performance, please look at the .gif illustrations
on my aleph FTP site at URL

    ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/

The short-term stability (including the 104 nsec sawtooth & intentional
power outages) are illustrated in tac-1sec.gif

The effect of going from 3-D position determination to "zero-D" position
hold mode is seen in oso-d270.gif, which is followed by 6 weeks of
uninterrupted "zero-D" operation in oso-clk.gif [note that there are
axis labelling errors on these plots -- the units are NANOSECONDS, not
microseconds. I never got arount to correcting the plots -- sorry]

My setup "Quickstart Guide" that virtually guarantees faultless performance
is in the file success.tac

>   Anyone know if it's possible to put the Oncore VP into position
>hold mode from NMEA mode? How about the argument for the Motorola binary
>mode. It's @@At something is 0 turn it off, and 1 turns it on?

No, position hold is ONLY invoked from the 9600 baud binary mode.

Tom

94. [TACGPS:653] RE: TAC32 -

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Sun, 14 Sep 1997 23:17:49 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19970915031124.0069348c@tomcat>
Rendered body type: text/plain

At 09:08 09/14/97 -0500, Allen (WA3ZYM) wrote:
>Hi Tom,
>
>Just wanted you and Rick to know that the time display in TAC32 using the
Garmin
>20 remains "frozen" (displays the time of startup of the program). This
occurs if
>PC is checked under display and there is no display of time at all if UTC is
>checked. Under EDIT the correct Com port and receiver type is checked.
After
>reading your description of development of Showtime, I wonder whether
TAC32 is
>deriving the date/time info from $GPZDA instead of $GPRMC message?

In SHOWTIME (and I believe in TAC32) the ZDA message is used if it is present, and RMC only if all else fails. The main reason for this is that ZDA is defined as the CURRENT UTC TIME while RMC/GGA report the time of the last valid position fix. For the ONCORE, where the preferred operating mode is "zero-D" "Position Hold", the GGA/RMC messages report the time when you last did a position fix, which may be weeks or months ago! ZDA, if present, is always the NMEA message to use for timing purposes. Also, the Date field in ZDA is neat and in logical YYMMDD order, while RMC is "ugly" with a DDMMYY format.

73, Tom

95. [TACGPS:654] Re: Low-Cost GPS antenna

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Sun, 14 Sep 1997 23:38:06 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19970915032544.0068e73c@tomcat>
Rendered body type: text/plain

Incredible! In only 24 hours, my note on the helix antenna brought 25+ responses. It won't be possible to reply to everyone. As soon as I have some notes together on the construction, I'll post them here. If/When I get a stock of MiniCircuits ERA-3 MMICs, I'll post that news.

To those who asked about "why 2 turns?": Longer helices (someone reported on trying an 8-turn GPS helix) have more gain and hence more directivity. For GPS applications, you want all-sky coverage. 2 turns yields a beamwidth of around +/- 60 degrees, equivalent to a one wavelength by one wavelength sized aperture. My experience has been that an integral number of turns yields the best circular polarization performance.

The normal feedpoint impedance of a helix is ~140 ohms and matching usually involves a "launcher" with the first 1/4 turn closer to the ground-plane. My approach was to achieve this by using "fat" conductors. The copper-foil tape I use is about 0.3" wide. FYI -- the input coupling capacitor on the MMIC LNA is made by putting scotch tape over ~1.5" of the antenna helix, and then putting another piece of copper foil on top. In addition to providing DC isolation for the MMIC, this makes a hi-pass filter on the input of the MMIC, minimizing the RFI susceptability.

73, Tom

96. [TACGPS:655] ERA-3 MMIC amplifiers

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Wed, 17 Sep 1997 09:38:27 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <341FEA85.6F3@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

This note is in response to all those of you who wrote me about needing a source for MiniCircuits ERA-3 MMIC low-noise amplifiers.

(1) The ERA-3 specifications can be gleaned from MiniCircuits online

catalog at

> http://www.minicircuits.com

Basically, the ERA-3 is spec'd to work to > 3 GHz. At the 1575 MHz GPS frequency, it has a gain ~21 dB and an in-circuit noise figure in the 3-4 dB range.

MiniCircuits shows the qty=30 price as $1.67 and in this quantity, you just make their $50 minimum order. They will take VISA/MC plastic money -- call 718-934-4500.

(2) ERA-3's in small quantity are available from Down East Microwave. Use your web browser to point to

> http://www.downeastmicrowave.com/Catalog.htm

and do a search on ERA-3, where you will find this entry:

> ERA-3 DC-8GHz,14dB Gain @ 6GHz,4.5dB Noise Figure,
> +13dBm @ 1dB Gain compression 4/$10.00

Down East will also accept plastic money. They are good guys and are responsible members of the amateur community.

(3) Because so many of you made the strong plea, I went ahead and placed a personal order for qty=100 units, which should be in my hands in a couple of days (from qty=30 to qty=100, the price break is about equal to their shipping cost). I will have them available for your convenience at next month's Baltimore DCC for $2.00 each (yes, I'm making a few pennies on each unit to cover my hassles!). As long as my stock holds out, I'll also provide them at the same $2 price to folks not attending the DCC by mail, providing:

a. You send me an SASE (I'd don't want the hassle of addressing packages, and at this price, I can't afford to pay your postage!). You should allocate 2 oz. of postage, and a fairly sturdy envelope is recommended (padded envelope, floppy disk mailer, etc.).

b. Cash only -- no plastic, no checks (again, I want to minimize the hassle factor).

c. No phone calls, PLEASE!!!

If you want to send me your SASE now, my mailing address (OK in any callbook) is:

Tom Clark, W3IWI
6388 Guilford Road
Clarksville, MD 21029

73, Tom

97. [TACGPS:656] SHOWTIME Error Message???

From: John Ackermann N8UR <jra@febo.com>
Date: Fri, 19 Sep 1997 06:07:45 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199709191122.HAA23299@meow.febo.com>
Rendered body type: text/plain

I'm having a problem getting my ONCORE receiver and SHOWTIME to talk to each other.

I can use the Motorola program to communicate with the receiver -- commands seem to work, and the display shows that I'm tracking a bunch of satellites.

But when I try to run Showtime (either version 3.32 or 3.31) the following happens:

1. I get the oscilloscope heartbeat with several beeps.

2. Showtime displays "Init @4800 @9600" twice

3. Showtime exits with the error:

Device I/O error in line 0 of module SHWTM331 at address 0C60:066E

(that's when I use version 3.31; the address shown is is slightly different
for version 3.32).

I've tried two different computers, several serial cables, and two different
com ports on one of the machines. I've tried running in a Win95 DOS window,
in Win95 MS-DOS mode, and under DOS 6.22.

Help!!!

John

- --VAA20455.874632567/meow.febo.com--

------- End of Forwarded Message

98. [TACGPS:657] 3 Simple Questions

From: "Eric Rosenberg" <erosenberg@orbcomm.net>
Date: Fri, 19 Sep 1997 13:11:50 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <9708198747.AA874703329@smtp_link.orbcomm.net>
Rendered body type: text/plain

1. What antenna connector is required to make an opened up GPS30PC
become a GPS-20? or...

Am I better off wiring a piece of coax from the GPS30PC board to
a connector on my box?

2. I understand that the GPS20 from TAPR has a built-in battery (for
backup) that the GPS30PC in it's original configuration does not have.

What type of battery do I need (and how do I install it) to make the
GPS30 look like a TAPR GPS20?

3. Which Power Trends power supply module is the proper one for the
TAC-2...horizontal or vertical or no tab?

4. Are the additional parts required for the above device included in
the TAC-2 kit?

Thanks in advance,

Eric W3DQ
--

erosenberg@orbcomm.net
w3dq@amsat.org

99. [TACGPS:658] Re: 3 Simple Questions

From: "Ronald G. Parsons" <w5rkn@amsat.org>
Date: Fri, 19 Sep 1997 13:58:40 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3422CAB2.CD64AFC3@amsat.org>
Rendered body type: text/plain

1. The GPS30PC has a small patch antenna on top of the shield around the
"GPS20" board. There is no connector on the GPS30PC board. Put whatever
connector you wish, or attach a coax to the board.

2. I haven't used the can opener on the GPS30PC board yet, but it does
remember things like time and ephemeris, so I assume there's a battery in
there somewhere.

Ron

Eric Rosenberg wrote:
>
> 1. What antenna connector is required to make an opened up GPS30PC
> become a GPS-20? or...
>
> Am I better off wiring a piece of coax from the GPS30PC board to
> a connector on my box?
>
> 2. I understand that the GPS20 from TAPR has a built-in battery (for
> backup) that the GPS30PC in it's original configuration does not have.
>

> What type of battery do I need (and how do I install it) to make the
> GPS30 look like a TAPR GPS20?
>
> 3. Which Power Trends power supply module is the proper one for the
> TAC-2...horizontal or vertical or no tab?
>
> 4. Are the additional parts required for the above device included in
> the TAC-2 kit?
>
> Thanks in advance,
>
> Eric W3DQ
> --
>
> erosenberg@orbcomm.net
> w3dq@amsat.org
>

--
Ron W5RKN

also:
rparsons@bga.com

100. [TACGPS:659] Re: 3 Simple Questions

From: clark@tomcat.gsfc.nasa.gov (Tom Clark -- W3IWI)
Date: Fri, 19 Sep 1997 14:51:05 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <37567@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Erik asked
> 3. Which Power Trends power supply module is the proper one for the
> TAC-2...horizontal or vertical or no tab?

Let me say it again -- The TAC-2 board will accommodate ANY of the 3-terminal Power Trends regulators. There are two sets of holes above U6. One set matches the "tab" version. The 2nd set matches the 1.5 amp solder-down type. If you get the type with no mounting tab, then I suggest the use of a dollop of epoxy or RTV at the hole that normally mounts the 7805. The horizontal vs vertical units are identical except that they bend the pins on the horizontal units and you have to bend the pins on the vertical units.

You can get the data sheets (and even order a free sample!) from their web site: http://www.powertrends.com
The relevant types are the PT5101x where x=N,A,S,H for the 5v parts. Although it really doesn't make a difference, I'd recommend H (Horizontal, with tab). The other nice version is the 78SR1 53 H -- this is the solder-down version (using the two smaller holes above U6) which can handle 1.5 amps. The "53" means it is trimmed to 5.25 volts, which, when combined with the ohmic drop thru RFC2 is just perfect! But DigiKey doesn't have the 78SR series and they do have the PT5101's

Tom

101. [TACGPS:660] Re: 3 Simple Questions

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Fri, 19 Sep 1997 15:11:08 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3422DB5F.1FAF@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Eric Rosenberg also asked:

> 4. Are the additional parts required for the above device included in
> the TAC-2 kit?

The default parts supplied with the TAC-2 kit are for a lossy 7805 regulator. Using the Power Trends you will require:

    - 2 @ 4-40 screws/nuts to bolt it down if it has the mounting tab
or - epoxy or RTV if it doesn't have a tab

and - 100 or 220 uf electrolytic (required)

and - 6.2 volt zener protection diode (recommended)

The cap and diode go in well marked locations on the PCB and are called out explicitly on the schematics.

I supplied 220 uf caps to TAPR to be included in the kits, but
apparently they didn't get into the parts bags. I had about 400,
sent them about 300. If you need the part, and it isn't in the
kit, and if TAPR can't find the bag I sent them, then I can
probably supply a few of the capacitors.

Tom

102. [TACGPS:661] Re: 3 Simple Questions

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Fri, 19 Sep 1997 15:18:27 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3422DCF9.23F3@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Eric Rosenberg also asked:

> 2. I understand that the GPS20 from TAPR has a built-in battery (for
> backup) that the GPS30PC in it's original configuration does not have.

Can someone who has opened up the GPS-30 say with certainty if or
if not there is a battery on the rcvr circuit board? I'd like to
put this to rest once & for all.

> What type of battery do I need (and how do I install it) to make the
> GPS30 look like a TAPR GPS20?

The BBRAM voltage requirements for the GPS-20 are 3.6 volts. The
TAC-2 PCB has provisions for adding a battery if one is required
(which is the case with the many of the ONCOREs). As described in
the TAC-2 documentation, the easiest 3.6v battery to use is the
NiCd replacement battery used in cordless telephones, already
equipped with a 2-pin connector that mates JP11. Such batteries
are seen at nearly every flea market, or can be purchased from
Radio Shack or DigiKey (parts numbers are in the TAC-2 documentation).
That batteries I use on my ONCOREs were NiCd that were obtained in
the Mendelson tent at Dayton for $1 each. The Radio Shack batteries
are $9.95.

Tom

103. [TACGPS:662] Re: 3 Simple Questions

From: "Ronald G. Parsons" <w5rkn@amsat.org>
Date: Fri, 19 Sep 1997 17:02:00 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3422F5A3.5C69690B@amsat.org>
Rendered body type: text/plain

I opened up a GPS30PC enough to get a good view of the area inside
corresponding to the battery location on a GPS 20 and, YES Virginia, there IS
a battery on the GPS30PC board. This agrees with my post earlier today saying
parameters do survive a power-off.

Ron

Dr Thomas A Clark (W3IWI) wrote:
>
> Eric Rosenberg also asked:
>
> > 2. I understand that the GPS20 from TAPR has a built-in battery (for
> > backup) that the GPS30PC in it's original configuration does not have.
>
> Can someone who has opened up the GPS-30 say with certainty if or
> if not there is a battery on the rcvr circuit board? I'd like to
> put this to rest once & for all.
>
> > What type of battery do I need (and how do I install it) to make the
> > GPS30 look like a TAPR GPS20?
>
> The BBRAM voltage requirements for the GPS-20 are 3.6 volts. The
> TAC-2 PCB has provisions for adding a battery if one is required
> (which is the case with the many of the ONCOREs). As described in
> the TAC-2 documentation, the easiest 3.6v battery to use is the
> NiCd replacement battery used in cordless telephones, already
> equipped with a 2-pin connector that mates JP11. Such batteries
> are seen at nearly every flea market, or can be purchased from
> Radio Shack or DigiKey (parts numbers are in the TAC-2 documentation).
> That batteries I use on my ONCOREs were NiCd that were obtained in

> the Mendelson tent at Dayton for $1 each. The Radio Shack batteries
> are $9.95.
>
> Tom

--
Ron W5RKN

also:
rparsons@bga.com

104. [TACGPS:663] Showtime Error msg

From: "Robert H. Ashley" <rashley@accessnv.com>
Date: Fri, 19 Sep 1997 17:36:40 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199709192226.PAA04669@bighorn.accessnv.com>
Rendered body type: text/plain

John Ackermann N8UR

One possible reason for your error message - an open connection
on the DCD line within the RS232 connector where it connects to
the TAC-2 board. This is pin #1 of P1 on the TAC-2 board.

I had a similar problem, but a different address in the error
message.
I am using version 3.34.

The problem was that the small points in the connector body that are
supposed to pierce the insulation of the ribbon cable and make
contact
with the inner wire were not making contact. I had an open
connection.
I had to cut the connector off the ribbon cable and install a new
one.

After that everything worked fine.

The Motorola program doesn't use the DCD signal so it is not affected
by the broken connection.

Showtime will not run without the DCD signal.
Make sure the computer is getting the DCD 1pps signal.

Good luck,

Bob, KD7B

105. [TACGPS:664] Re: Showtime Error msg

From: John Ackermann N8UR <jra@febo.com>
Date: Fri, 19 Sep 1997 17:48:35 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199709192258.SAA26288@meow.febo.com>
Rendered body type: text/plain

Thanks for the idea, Bob. I ended up building a new Oncore-to-RS-232 cable
(not using the TAC at the moment) and that seems to have cured the problem --
there was no visible line break, but one of the connections must have been
flaky.

73,
John

> One possible reason for your error message - an open connection
> on the DCD line within the RS232 connector where it connects to
> the TAC-2 board. This is pin #1 of P1 on the TAC-2 board.
>
> I had a similar problem, but a different address in the error
> message.
> I am using version 3.34.
>
> The problem was that the small points in the connector body that are
> supposed to pierce the insulation of the ribbon cable and make
> contact
> with the inner wire were not making contact. I had an open
> connection.
> I had to cut the connector off the ribbon cable and install a new
> one.

>
> After that everything worked fine.
>
> The Motorola program doesn't use the DCD signal so it is not affected
> by the broken connection.
>
> Showtime will not run without the DCD signal.
> Make sure the computer is getting the DCD 1pps signal.
>
> Good luck,
>
> Bob, KD7B

106. [TACGPS:665] Another GPS!?

From: Lyle Johnson <lylej@azstarnet.com>
Date: Sat, 20 Sep 1997 13:18:27 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19970920104938.00cce090@pop.azstarnet.com>
Rendered body type: text/plain

I was at ION-97 through yesterday evening. A couple interesting products.

1) Asthech announced the G8. This is an 8-channel parallel unit with pretty high performance. It has no special time features, but the price is (roll of drums) $98 in 100s. Might be a good thing for TAPR to pursue in lieu of the Garmin stuff? They claim time is +/- 1 uSec. I will be in Sunnyvale next week and will try and pry loose a couple of units...

2) Trimble had a pair of new products.

ACE is the same size (apparently) as the old SV6 CM3 board. It is "a little larger and a little cheaper" than the SK8. Its timing specs are better than the SK8. We get SK8s for about $175 (in 1K qty) so I'm not sure what "a little cheaper" means and neither was Trimble... They claim the time is "+/- 95 nSec in overdetemrined clock mode" whatever that means :-)

Thunderbolt is a "GPS Disciplined Clock for the Wireless Infrastructure." 1 PPS is UTC +/- 50 nSec. They have an elaborate graph of 10 MHz output accuracy from 1 to 500 seconds displaying the Allan Variance. GOes from 10^-9 at 1 second to better thatn 10^-10 at 10seconds and longer. Phase noise is -120 dBc/Hz at 10 Jz, -135 at 100 Hz and 1 kHz, -145 at 10 kHz and 100 kHz.

Oh yes, price is $1500 in unit qty with "no options." A double-ovened crystal oscillator, etc., adds cost. They were a little vague, and the demoware was an empty box (the world's lightest GPS prcision clock).

3) There were other cheap GPS units, mostly based on the SiRF technology, which is aimed at automotive use. I got conflicting information on whether it had 1 PPS output. I did verify that their chipset/algorithms ignore all multipath problems as they are shooting for 60 meters accuracy at the present time. I don't pretend to know how that might or might not affect timing.

4) The timing session. Most reports not based on bazillion-dollar setups wre based on the VP Oncore. It seems to be the consensus that thi sis the best cheap timing engine.

Cheers,

Lyle

107. [TACGPS:666] Archive?

From: Reg Clemens <reg@dwf.com>
Date: Sat, 20 Sep 1997 13:38:46 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199709201837.MAA04931@clemens.dwf.com>
Rendered body type: text/plain

Is there an archive of back issues of the Digest of this list?

Reg.Clemens
reg@dwf.com

108. [TACGPS:667] Re: Another GPS!?

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Sat, 20 Sep 1997 13:45:26 -0500 (CDT)
To: tacgps@tapr.org

Message-ID: <v0311070db049c787487b@[208.134.134.40]>
Rendered body type: text/plain

>I was at ION-97 through yesterday evening. A couple interesting products.
>
>1) Asthech announced the G8. This is an 8-channel parallel unit with
>pretty high performance. It has no special time features, but the price is
>(roll of drums) $98 in 100s. Might be a good thing for TAPR to pursue in
>lieu of the Garmin stuff? They claim time is +/- 1 uSec. I will be in
>Sunnyvale next week and will try and pry loose a couple of units...

We are fixing to switch over to the 12-channel parallel Garmin OEM unit in
Octobter once I can get all the info from Garmin concerning TAPR pricing
and info for the web page. Just shipped our last GPS-20s for a bit. I
guess this is the semi-official announcement before it hits the web page
and TAPR-BB in the next 2-3 weeks as well as the PSR. We completed an
agreement with Garmin two weeks ago (to be announced in the next PSR ;-) to
be able to order less than 100 and get 100 qty pricing! That should help
all the experimenters in the amateur world. More in the next PSR.

Everyone on the list -- don't forget that the 1997 ARRL and TAPR DCC is in
October in Baltimore. Tom Clark and others will be there -- so good time
to talk about TAC and the future of TOC for those interested. Pre-Reg was
up to 80 people , so I figure that we see between 150 and 200 people at the
conference. Should be a great one. http://www.tapr.org/dcc

Cheers - Greg

Greg Jones, WD5IVD
Austin, Texas
wd5ivd@tapr.org
http://www.tapr.org/~wd5ivd

    "Before you become too entranced with gorgeous gadgets
     and mesmerizing video displays, let me remind you that
     information is not knowledge, knowledge is not wisdom,
     and wisdom is not foresight. Each grows out of the other
     and we need them all."   -Arthur C. Clarke

109. [TACGPS:668] Thanks

From: "Eric Rosenberg" <erosenberg@orbcomm.net>
Date: Sat, 20 Sep 1997 20:54:09 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <9708208748.AA874817671@smtp_link.orbcomm.net>
Rendered body type: text/plain

Thanks to all who responded to my simple questions.

     Especially to W3IWI, who re-stated his answers re:Power Solutions
     power supplies in such a way that I now know which version to purchase
     in order to have it fit on my board! That specific information (i.e.,
     which version, vertical or horizontal, with or without heat tabs) is
     missing from the docs, Tom,

     Likewise in re:the extra components. Everywhere else there is menton
     of RS part numbers, but again, the extra parts are not
     referenced...and no, the extra electrolytic didn't come in my kit.

     Now all I need is to get my GPS receiver!

     Eric W3DQ

110. [TACGPS:669] Thanks for Answers...

From: "Eric Rosenberg" <erosenberg@orbcomm.net>
Date: Sat, 20 Sep 1997 20:54:16 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <9708208748.AA874817673@smtp_link.orbcomm.net>
Rendered body type: text/plain

Thanks to all who responded to my simple questions.

     Especially to W3IWI, who re-stated his answers re:Power Trends power
     supplies in such a way that I now know which version to purchase in
     order to have it fit on my board! That specific information (i.e.,
     which version, vertical or horizontal, with or without heat tabs) is
     missing from the docs, Tom,

Likewise in re:the extra components (cap, zener, and choke that Tom
doesn't mention). Everywhere else there is menton of RS part numbers,
but again, the extra parts are not referenced...and no, the extra
electrolytic didn't come in my kit.

Now all I need is to get my GPS receiver!

Eric W3DQ

111. [TACGPS:670] Re: Archive?

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Sat, 20 Sep 1997 21:22:28 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <v03110700b04a3279df02@[208.134.134.40]>
Rendered body type: text/plain

Yep.

Since the list isn't doing some of the list currently, I do this one by hand.

You can find them in:

<ftp://@ftp.tapr.org/tapr/tac2/mail_archives/>

That is for Jul, Aug, and Sept currently.

Cheers - Greg

>Is there an archive of back issues of the Digest of this list?
>
>   Reg.Clemens
>   reg@dwf.com

Greg Jones, WD5IVD
Austin, Texas
wd5ivd@tapr.org
http://www.tapr.org/~wd5ivd

"Before you become too entranced with gorgeous gadgets
and mesmerizing video displays, let me remind you that
information is not knowledge, knowledge is not wisdom,
and wisdom is not foresight. Each grows out of the other
and we need them all." -Arthur C. Clarke

112. [TACGPS:671] Re: Another GPS!?

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Sun, 21 Sep 1997 20:57:02 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19970922005420.0068d8b4@tomcat>
Rendered body type: text/plain

At 13:18 09/20/97 -0500, Lyle wrote:
>I was at ION-97 through yesterday evening. A couple interesting products.
>
>1) Asthech announced the G8. This is an 8-channel parallel unit with
>pretty high performance. It has no special time features, but the price is
>(roll of drums) $98 in 100s. Might be a good thing for TAPR to pursue in
>lieu of the Garmin stuff? They claim time is +/- 1 uSec. I will be in
>Sunnyvale next week and will try and pry loose a couple of units...

I have some dealings with Ashtech and they had indicated that its likely
that I'll get a "beta" unit. Now that I know its released I'll bug them
to make good on their promises!

>2) Trimble had a pair of new products.
>
>ACE is the same size (apparently) as the old SV6 CM3 board. It is "a
>little larger and a little cheaper" than the SK8. Its timing specs are
>better than the SK8. We get SK8s for about $175 (in 1K qty) so I'm not
>sure what "a little cheaper" means and neither was Trimble... They claim
>the time is "+/- 95 nSec in overdetemrined clock mode" whatever that means
:-)

I presume "overdetermined clock" and those specs mean that they are finally
doing what I've called "zero-D"

>Thunderbolt is a "GPS Disciplined Clock for the Wireless Infrastructure." 1
>PPS is UTC +/- 50 nSec. They have an elaborate graph of 10 MHz output
>accuracy from 1 to 500 seconds displaying the Allan Variance. GOes from
>10^-9 at 1 second to better thatn 10^-10 at 10seconds and longer. Phase
>noise is -120 dBc/Hz at 10 Jz, -135 at 100 Hz and 1 kHz, -145 at 10 kHz and
>100 kHz.
>
>Oh yes, price is $1500 in unit qty with "no options." A double-ovened
>crystal oscillator, etc., adds cost. They were a little vague, and the
>demoware was an empty box (the world's lightest GPS prcision clock).

Interesting -- that's about what I forecast for the TOC.

>3) There were other cheap GPS units, mostly based on the SiRF technology,
>which is aimed at automotive use. I got conflicting information on whether
>it had 1 PPS output. I did verify that their chipset/algorithms ignore all
>multipath problems as they are shooting for 60 meters accuracy at the
>present time. I don't pretend to know how that might or might not affect
>timing.

Everybody & his brother is getting into the "commodity GPS" biz, it seems!

>4) The timing session. Most reports not based on bazillion-dollar setups
>wre based on the VP Oncore. It seems to be the consensus that thi sis the
>best cheap timing engine.

Was there any mention made of our adventures?

Then Greg said:

>We are fixing to switch over to the 12-channel parallel Garmin OEM unit in
>Octobter once I can get all the info from Garmin concerning TAPR pricing
>and info for the web page.   Just shipped our last GPS-20s for a bit. I
>guess this is the semi-official announcement before it hits the web page
>and TAPR-BB in the next 2-3 weeks as well as the PSR. We completed an
>agreement with Garmin two weeks ago (to be announced in the next PSR ;-) to
>be able to order less than 100 and get 100 qty pricing! That should help
>all the experimenters in the amateur world. More in the next PSR.

I presume this is the GPS-25. The one report I've had on the timing is that
the -25 (unlike the -20) does NOT have the wide 1PPS signal that I regard
as a "TAC requirement". If this is true, then we will have to invoke the
555 timer on the TAC-2 for compatibility. If so, then somebody better get
their hands on a -25 ASAP to figure out the jumpers and parts needed!

73, Tom

113. [TACGPS:672] TAC32 Version 1.0.9 available

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Mon, 22 Sep 1997 21:40:59 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCC7A7.92E55460.rick@cnssys.com>
Rendered body type: text/plain

Version 1.0.9 of TAC32 is now available at http://www.cnssys.com/tac32.
This version adds the Maidenhead Grid Square display and may correct the
variation in latency when sound is turned on with a slow computer.

This version does not correct the incompatibility with Garmin receivers.
 Anyone out there willing to loan me a Garmin for a couple of weeks so I
can sort that problem out?

Rick
WB2TNL

114. [TACGPS:673] Re: TAC32 Version 1.0.9 available

From: Lyle Johnson <lylej@azstarnet.com>
Date: Mon, 22 Sep 1997 22:06:43 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19970922195811.00735ff4@pop.azstarnet.com>
Rendered body type: text/plain

At 09:40 PM 9/22/97 -0500, you wrote:
>Version 1.0.9 of TAC32 is now available at http://www.cnssys.com/tac32.
>This version adds the Maidenhead Grid Square display and may correct the
>variation in latency when sound is turned on with a slow computer.
>
>This version does not correct the incompatibility with Garmin receivers.
> Anyone out there willing to loan me a Garmin for a couple of weeks so I

>can sort that problem out?

Rick,

I have an unused Garmin engine that I bought from TAPR. You are welcome to
borrow it, hook it up, etc. SHucks, I might even find out if it works this
way!

Which address should I send it to and do you have a preferred method of
shipment?

73,

Lyle

115. [TACGPS:674] Re: TAC32 Version 1.0.9 available

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Tue, 23 Sep 1997 06:50:30 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCC7F5.05D6A800.rick@cnssys.com>
Rendered body type: text/plain

Lyle,

Thank you very much. Ship to:

Richard M. Hambly
CNS Systems, Inc.
363 Hawick Court
Severna Park, MD 21146-1409

(410) 987-7835

Ship by any means you wish. I will be out of the office Wed-Fri so US Mail or UPS would be fine.

Rick
WB2TNL

-----Original Message-----
From: Lyle Johnson [SMTP:lylej@azstarnet.com]
Sent: Monday, September 22, 1997 11:07 PM
To: tacgps@tapr.org
Subject: [TACGPS:673] Re: TAC32 Version 1.0.9 available

At 09:40 PM 9/22/97 -0500, you wrote:
>Version 1.0.9 of TAC32 is now available at http://www.cnssys.com/tac32.
>This version adds the Maidenhead Grid Square display and may correct the
>variation in latency when sound is turned on with a slow computer.
>
>This version does not correct the incompatibility with Garmin receivers.
> Anyone out there willing to loan me a Garmin for a couple of weeks so I
>can sort that problem out?

Rick,

I have an unused Garmin engine that I bought from TAPR. You are welcome to
borrow it, hook it up, etc. SHucks, I might even find out if it works this
way!

Which address should I send it to and do you have a preferred method of
shipment?

73,

Lyle

116. [TACGPS:675] Re: Another GPS!?

From: "Doug McKinney" <buoy@mcktech.com>
Date: Tue, 23 Sep 1997 11:09:30 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199709231602.JAA20721@mail.redshift.com>
Rendered body type: text/plain

> From: Tom Clark (W3IWI) <clark@tomcat.gsfc.nasa.gov>
> To: tacgps@tapr.org
> Subject: [TACGPS:671] Re: Another GPS!?
> Date: Sunday, September 21, 1997 6:57 PM
>

```
.....................................
> > Then Greg said:
>
> >We are fixing to switch over to the 12-channel parallel Garmin OEM unit
in
> >Octobter once I can get all the info from Garmin concerning TAPR pricing
> >and info for the web page.   Just shipped our last GPS-20s for a bit.  I
> >guess this is the semi-official announcement before it hits the web page
> >and TAPR-BB in the next 2-3 weeks as well as the PSR.  We completed an
> >agreement with Garmin two weeks ago (to be announced in the next PSR ;-)
to
> >be able to order less than 100 and get 100 qty pricing!  That should
help
> >all the experimenters in the amateur world.  More in the next PSR.
>
> I presume this is the GPS-25. The one report I've had on the timing is
that
> the -25 (unlike the -20) does NOT have the wide 1PPS signal that I regard
> as a "TAC requirement". If this is true, then we will have to invoke the
> 555 timer on the TAC-2 for compatibility. If so, then somebody better get
> their hands on a -25 ASAP to figure out the jumpers and parts needed!
>
> 73, Tom
>
I have the GARMIN GP25 with the active antenna GA27A.  The GP20 and GP25
have the same dimensions and mounting hole pattern.  The pinouts are the
same: pin1 txd2, pin2 rxd2, pin3 1pps, pin4 txd1, pin5 rxd1, pin6 reset,
pin7 vaux, pin 8 ground, pin9 nc, pin10 vcc, pin11 nc and pin12 nmea.  1pps
is a 1us high pulse at 1Hz with a 300ns rise and fall into a 250 impedance.
 The pulse is ~700mv into a 50 ohm load.  The pulse function is turned off
as a default and requires a software command to start the 1pps output.
GARMIN is comming out with an up dated GP25 with 2 hardware changes and a
third hardware change on the boards. The hardware changes are:
        GP25 LVS (Low Voltage (3.6-6v) RS232)  this adds the 3.6-6v input range to
the current GP25 (5v) therefore, lower power used at 3.6v)
        GP25 LVC (Low Voltage (3.6-6v) CMOS) this drops the RS232 and leaves CMOS
TTL levels (LVS=220ma; LVC=140ma!)
        GP25 HVS (High Voltage (6-40v buck regualtor)RS232) this is planned, but
requires a volume request to cause development
73 Doug
```

117. [TACGPS:676] Re: 3 Simple Questions

```
From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Tue, 23 Sep 1997 15:38:42 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <34282843.4AD7@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain
```

```
Matthew Francey sent me this frightening report, which I'll answer in
public.
It follows the thread started by Erik named "3 Simple Questions":

> >The other nice version is the 78SR1 53 H -- this is the solder-down version
> >(using the two smaller holes above U6) which can handle 1.5 amps. The "53"
> >means it is trimmed to 5.25 volts, which, when combined with the ohmic drop
> >thru RFC2 is just perfect! But DigiKey doesn't have the 78SR series and they
> >do have the PT5101's
>
> My printed copy of the TAC-2 assembly manual states that one power supply
> option for the TAC-2 is the 78ST105ND (or similar).  So I ordered one
> from Digikey, soldered it and the related components into place and
> powered up the TAC-2.
>
> Poof.
>
> I lost my GPS receiver [Oncore VP], probably the antenna, and likely
> most of the active components on the board because of this mis-placed
> trust in the printed doco.  Subsequent testing revealed the power supply
> was putting out 10.5V ... dumb dumb dumb!  This is what happens
> when you try to jump ahead of checklists.  Never. Ever. Again.
>
> If you can check the current manual, and confirm that part number is in
> error, it probably should be fixed *pronto* and a small announcement to
> the effect made in the mailing list.

First, let me apologize for not having reviewed the final documentation
that
was sent with the TAC-2 kits -- much of my summer was spent out of the
country
```

and out of touch. I didn't have a set of the "final" documentation that
was
sent with the kits, so I fetched a set from www.tapr.org today so we
would
all be dealing from the same deck of cards.

The references to the Power Trends (PT) regulators first appear on page
9,
noting "Section 8.5" -- the sections were numbered in the original
documentation
but I see that the PDF'd versions lost the section numbers. Anyway the
reference
points to Page 17.

I went to both the DigiKey web site (http://www.digikey.com where
catalog page
155 shows the PT 78ST105ND part as a 5.0 volt regulator, not as a 10.5
volt
part as you seem to have gleaned. This is confirmed on PT's web site at
URL
http://www.powertrends.com where they show the part numbering in the
format
78ST1 xx y C where xx=05 means 5.0 volts and y defines the package
style.
[for the case of the 78SR153HC part I recommended in my message, xx=53
means
5.25 volts. I suggested that the small quarter-volt overhead will insure
that you have about 5.1v left after you take the loss "hit" by
installing RFC2,
but DigiKey doesn't show the 78SR153HC part in their catalog].

Therefore I conclude that your problem does not lie in the regulator as
you
surmised (unless PT happened to produce a really bogus unit. To my
knowledge,
their units are 100% tested and they have a very good reputation, so I
think
that this is a very unlikely case.). In gleaning the PT catalog, they do
not
have a 10.5 volt unit at all, the closest being xx=09 for 9v or xx=12
for 12v.

In the notes, and in the schematic I noted that a 6.2 volt Zener Diode
be placed
at Z1 for safety. I'm curious if you used the zener?

The most likely thing I can think of is that somehow you have the input
shorted
to the output on the circuit board and that the 10.5v you see is in fact
the
input supply voltage, minus the drop associated with D8 and RFC1 (which
would
about 0.8 volts or so).

I'll be anxious to hear what you find -- I really don't see that the
problem
lies with the basic TAC-2 design or the PT regulator you ordered.

73, Tom

118. [TACGPS:677] TAC-2 Schematics

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Tue, 23 Sep 1997 16:12:26 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <34282FC6.30DD@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

In pulling over the material to answer Matthew's question I found I
needed to reconstruct a copy of the documentation that was sent with
the TAC-2 kits.

In doing so, I see that the schematic drawings that are in the .PDF
files are not my latest version -- I spotted this because the drawing
package I prepared for the kit had FIVE drawings, and the .PDF file
has only FOUR. The missing fifth drawing is the one that documents all
the "what does this jumper really do?" cases, interconnect cables, etc.

Greg -- the "current" "correct" and "final" drawings in both PostScript
and HP LaserJet formats in the private TAC2 area on ftp.tapr.org that

we used for the kit development. It would be a good idea to move them
to the general user ftp.tapr.org area. The two magic files are:
          ~/tac2/dwg2c-ps.zip and ~/tac2/dwg2c-lj.zip
and they are dated 970506.

For the other TAC-2 folks -- until the correct files get posted on
ftp.tapr.org, you can pick them up on my aleph file server at URL

         ftp://aleph.gsfc.nasa.gov/GPS/tac2/

where you will find two .zip files. In each .zip file you will
find files named like tac2c-s# which corresponds to the final
schematic sheets #1 thru #5. You have two choices: -ps is printable
PostScript (which was tested/verified with GhostScript, although
you may have to adjust the printer x & y offsets to make them fit
on a page) and -lj which can be printed on any LaserJet 3 or later
by simply copying the .prn files to LPT1:

73, Tom

119. [TACGPS:679] GPS-20 Manual?

From: "Eric Rosenberg" <erosenberg@orbcomm.net>
Date: Wed, 24 Sep 1997 13:09:18 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <9708248751.AA875135256@smtp_link.orbcomm.net>
Rendered body type: text/plain

Is there a technical or other manual for the GPS-20/35PC?
If so, from where?

Thanks,
Eric W3DQ
erosenberg@orbcomm.net

120. [TACGPS:680] Re: GPS-20 Manual?

From: "Doug McKinney" <buoy@mcktech.com>
Date: Wed, 24 Sep 1997 16:23:22 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199709242121.OAA12485@mail.redshift.com>
Rendered body type: text/plain

> From: Eric Rosenberg <erosenberg@orbcomm.net>
> To: tacgps@tapr.org
> Subject: [TACGPS:679] GPS-20 Manual?
> Date: Wednesday, September 24, 1997 11:09 AM
>
> Is there a technical or other manual for the GPS-20/35PC?
> If so, from where?
>
> Thanks,
> Eric W3DQ
> erosenberg@orbcomm.net
>
GP30 is the GP20 with and in antenna (multitrac)
GP35 is the GP25 with and in antenna (12 channel unit)
Brad Wiseman of Garmin is the technical person to find out about the
manual. his e-mail is brad.wiseman@garmin.com.
Now you can tell me how to write the HTML code to make
'brad.wiseman.garmin.com' into that blue link used in IE!

121. [TACGPS:681] Re: GPS-20 Manual?

From: "Ronald G. Parsons" <w5rkn@amsat.org>
Date: Wed, 24 Sep 1997 16:23:40 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <34298118.681FE671@amsat.org>
Rendered body type: text/plain

One comes with each GPS 20 and I assume one will also come with the GPS30PC.

Check with the TAPR office.

Ron

Eric Rosenberg wrote:
>

> Is there a technical or other manual for the GPS-20/35PC?
> If so, from where?
>
> Thanks,
> Eric W3DQ
> erosenberg@orbcomm.net

--
Ron W5RKN

also:
rparsons@bga.com

122. [TACGPS:682] Re: TAC32 Version 1.0.9 available

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Wed, 24 Sep 1997 21:29:20 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3429BD79.2646@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Richard M. Hambly wrote:
>
> Version 1.0.9 of TAC32 is now available at http://www.cnssys.com/tac32.
> This version adds the Maidenhead Grid Square display and may correct the
> variation in latency when sound is turned on with a slow computer.
>
> This version does not correct the incompatibility with Garmin receivers.
> Anyone out there willing to loan me a Garmin for a couple of weeks so I
> can sort that problem out?
>
> Rick
> WB2TNL

Rick -- 1.0.9 lost part of the date field here -- month & year on the
2nd
line. I see you included my "extended" Maidenhead calculation from
SHOWTIME (the .75 part of FM19me.75).

Tom

123. [TACGPS:683] Re: TAC32 Version 1.0.9 available

From: "Richard M. Hambly (\"Rick\")" <rick@cnssys.com>
Date: Thu, 25 Sep 1997 09:37:09 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCC04E.B5264EE0.rick@cnssys.com>
Rendered body type: text/plain

Tom,

Sorry about the date field. I have to make the little boxes big enough for
the largest data to be housed in them. It's hard to know how big that has
to be sometimes. I'm on travel in Ithaca, NY right now so I will fix this
when I get back, probably Sunday.

Yes, I saw that you had extended the grid square calculation and I promised
that TAC32 would do everything that Showtime does, so in it went! I trust
you are pleased.

Rick

-----Original Message-----
From: Tom Clark (W3IWI) [SMTP:clark@tomcat.gsfc.nasa.gov]
Sent: Wednesday, September 24, 1997 10:29 PM
To: tacgps@tapr.org
Subject: [TACGPS:682] Re: TAC32 Version 1.0.9 available

Richard M. Hambly wrote:
>
> Version 1.0.9 of TAC32 is now available at http://www.cnssys.com/tac32.
> This version adds the Maidenhead Grid Square display and may correct the
> variation in latency when sound is turned on with a slow computer.
>
> This version does not correct the incompatibility with Garmin receivers.
> Anyone out there willing to loan me a Garmin for a couple of weeks so I
> can sort that problem out?
>
> Rick
> WB2TNL

Rick -- 1.0.9 lost part of the date field here -- month & year on the
2nd
line. I see you included my "extended" Maidenhead calculation from
SHOWTIME (the .75 part of FM19me.75).

Tom

124. [TACGPS:684] "SA Watch" Software?

From: John Ackermann N8UR <jra@febo.com>
Date: Sat, 27 Sep 1997 20:50:24 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199709272204.SAA00666@meow.febo.com>
Rendered body type: text/plain

I just downloaded a nifty shareware program called SA Watch. It takes the GPS
output and plots each fix over a 200 meter radius so you can watch the signal
move with SA.

It also displays the position of each SV in the constellation, showing whether
the bird is being tracked, and using little "contrails" so you can follow each
SV and determine your view of the sky.

But the neatest thing is that it maintains a "weighted mean lat/long" that
appears to weight using the HDOP value.

My question is -- has anyone else on the list compared SA Watch's weighted
mean against the average position function in ShowTime? If so, which is the
better tool to use for determining a position over a long (several day)
averaging period? I'm trying to get my position fixed as accurately as
possible so ShowTime has an accurate reference point for timekeeping.

Thanks for any info...

73,
John N8UR (ex-AG9V)
jra@febo.com

125. [TACGPS:685] Re: "SA Watch" Software?

From: John Ackermann N8UR <jra@febo.com>
Date: Sun, 28 Sep 1997 20:03:33 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199709290120.VAA01252@meow.febo.com>
Rendered body type: text/plain

> At 08:50 PM 9/27/97 -0500, you wrote:
> >I just downloaded a nifty shareware program called SA Watch.
> >
>   Hi John:.....Can you give me the download address. I would
> also like to do some comparing.
>
>   Thanks, Charlie K3VDB

I don't have the website URL handy, but the author can be reached at
stan@mutadv.com.

John

126. [TACGPS:686] Re: "SA Watch" Software?

From: clark@tomcat.gsfc.nasa.gov
Date: Sun, 28 Sep 1997 22:08:19 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <38484@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

John -- SHOWTIME has had the ability to do a weighted average for some
time. The averaging can be turned on/off with a switch, and the averaging
parameters can be set. SHOWTIMEs algorithm also allows you to examine the
repeatibility of multiply smootherd position averageds. (sorry -- I seem
to be hitting the wrong key tonite, and backspace doesn't work in the
Telnet I'm using right now).

SHOWTIME uses HDOP as the weighting for the horizontal position, and VDOP
to weight the heights. I went to a lot of work to justify the theoretical
basis for the averaging algorithms I use in SHOWTIME asnd have done a lot
of testing against really high accuracy clock. If you follow the proceedure
I described in the file "success.tac", I can give you a 99-44/100% guarnetee
that the timing will have an RMS accuracy, tracable all the way to the USNO's
master clock, of better than 30 nsec.

Tom

127. [TACGPS:687] Re: "SA Watch" Software?

From: mdf@angoss.com (Matthew Francey)
Date: Sun, 28 Sep 1997 22:43:54 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199709290339.DAA13820@hydrogen>
Rendered body type: text/plain

A while ago I had collected a couple hundred thousand positions from my
Oncore VP, along with the various DOP's that the receiver provides.

I was surprised to discover that weighting the average based on the DOP's
wasn't much different than a boring unweighted average. Furthermore, when
I plotted the error in position against the DOP I could discern no obvious
tendency for the error to be large when the DOP was large.

My theory (if I didn't screw up) is that SA dominates the
error-in-position -- and since the DOP can't estimate the effects of SA,
I visually observe no correlation. Perhaps careful analysis would reveal it?

128. [TACGPS:688] 1997 ARRL and TAPR DCC Reminder

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Tue, 30 Sep 1997 16:02:45 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <v03110717b0570c981bd4@[208.134.134.40]>
Rendered body type: text/plain

Don't forget that the 16th Annual ARRL and TAPR Digital Communications
Conference is in just a few days!

It is not to late to make the conference. Registration is already at a
high and we expect a really great conference! Hope to see you in Baltimore.

1997 ARRL and TAPR Digital Communications Conference
October 10-12, 1997
Baltimore, Maryland (minutes from BWI airport)

Main Web Page -- http://www.tapr.org/dcc
Tentative Schedule -- http://www.tapr.org/tapr/html/dcc97schedule.html
Proceedings Abstracts -- http://www.tapr.org/tapr/html/cnc16.html
Local Attractions -- http://www.tapr.org/tapr/html/dcc97_attractions.html

----

The 1997 ARRL and TAPR Digital Communications Conference will be held on
October 10-12, 1997 in Baltimore, Maryland. This years conference location
is just minutes away from the BWI Airport.

 What can you expect during the 1997 ARRL and TAPR Digital Communications
Conference ?
* A full day of papers and breakouts on Saturday for the beginner to the
advanced amateur digital enthusiast.

* Three workshops
        o Friday (1pm - 8pm) - APRS Symposium (http://www.aprs.net/dcc/)
        o Friday (4pm - 8pm) - Seminar on RF Basics for Computer Weenies
        o Sunday (8:30am - 1:30pm) - Seminar on Spread Spectrum system
Design and Theory

* The second annual Student paper session.

* A banquet with a Special Guest Speaker Yutaka Sakurai, JF1LZQ who is Vice
President of Japan's Packet Radio User's Group (PRUG). His talk is
entitled, "Japan's PRUG: A look at its history and a view to the future".
He will discuss the history of the PRUG from its early beginnings in the
mid-80's and track its development to today. He will also discuss some of
PRUG's current projects and its goals for the future.

* SIGs (Special Interest Groups) on Saturday following the banquet.

* Informal get-togethers throughout the weekend.

* TAPR Membership Meeting

Special Symposiums/Seminars

In addition to the presentation of papers on Saturday, three symposiums/seminars will be held before and after the conference. These sessions are provided to allow those with additional time and interest to make the most of the Digital Communications Conference. For those that might have interest in just a symposium or seminar, registration for the conference is not necessary to register and attend one or more of the symposiums and seminars. This allows maximum flexibility for those that might want to participate during the Digital Communications Conference, but do not have an entire weekend to devote to the event.

A full day symposium on Friday covering APRS will be conducted by Bob Bruninga, WB4APR (father of APRS) Keith Sproul, WU2Z, Mark Sproul, KB2ICI (developers of Mac and Windows APRS), Steve Dimse, K4HG (developer of javAPRS), and other nationally known APRS leaders. Join this group for the afternoon and evening for in depth discussions and presentations on the current and future status of APRS. This is an unique opportunity to gain insight into this fast growing digital aspect of amateur operations that combines computers, packet radio, and GPS (Global Positioning System). See http://www.aprs.net/dcc/ for schedule.

Starting late Friday afternoon a half-day seminar entitled "RF Basics for Computer Weenies: Helping the RF-challenged get the most out of the new high-speed wireless toys" presented by Mike Cheponis, K3MC. The seminar will focus on such topic as basic antenna types and their characteristics, comparison of feedlines and connector types, propagation basics (calculation of path loss, multipath effects, fresnel zones, etc), weatherproofing, lightning protection, filters, basic RF measurements, and other issues related to maintaining radio equipment on the UHF/SHF bands. This seminar will be starting late enough in the afternoon on Friday to allow those flying on that day to attend the seminar.

On Sunday morning, Dewayne Hendricks, WA8DZP, Phil Karn, KA9Q, and Tom McDermott, N5EG, will conduct a seminar focusing on "Spread Spectrum System Design and Theory." All three presenters are well known for their work in various areas of amateur digital communications and this 5 hour seminar should be an excellent opportunity to learn about the design and theory of spread spectrum systems. This seminar is a follow up to the past two seminars of PCS technology by Dewayne with a new focus on system design.

Airports

* The closest airport is Balitmore/Washington International (BWI)
* For those flying internationally or located on the East coast, check flights into
    - o Dulles International or
    - o Washington National Airport
* Bus/rail service from either Dulles or Washington to BWI is available, but be sure to check on this before arriving.

Hotel Information

Conference presentations, meetings, and workshops will be held at the Holiday Inn BWI Airport. DCC special rooms rates are $89 per night. When making reservations with the hotel, be sure to indicate you are attending the ARRL and TAPR DCC conference. The hotel provides transportation to and from BWI Airport, Amtrak/MARC rail station, and the local Baltimore Light Rail. You should contact the hotel to arrange transportation.

Holiday Inn BWI Airport (conference hotel)
890 Elkridge Landing Rd, Linthicum, MD, 21090
(410) 859-8400, Fax (410) 684-6778

3912.00N and 07641.34W

Directions to Conference

Coming from Baltimore Metro Area:
Follow MD-295 SOUTH towards BWI airport
Take W. NURSERY Rd exit
LEFT at the list at the end of the exit
RIGHT at the 3rd light, WINERSON Rd

LEFT at the 1st light, ELKRIDGE LANDING Rd
Holiday Inn BWI will be 1/2 mile on right.

Coming from Annapolis:
Follow I-97 NORTH/RT. 3 NORTH
Take DORSEY Rd Exit (rt 176 West)
RIGHT onto AVIATION Blvd (Rt 162)
Pass BWI Satellite parking
Follow signs to BWI Airport
RIGHT onto ELKRIDGE LANDING Rd
Holiday Inn BWI will be 1/2 mile on left.

Coming from Washington, DC:
Follow I-95 NORTH or MD-295 NORTH towards Baltimore
Take I-195 EAST towards BWI airport
Take EXIT 1A (Rt. 170 North)
LEFT at 2nd light, ELKRIDGE LANDING Rd
Holiday Inn BWI will be 1/2 mile on left.

Coming from the North:
Follow I-95 SOUTH or NEW JERSEY TURNPIKE SOUTH to I-95 South
Take I-95 SOUTH to I-195 EAST/AIRPORT to
Rt. 170 NORTH LINTHICUM to 2nd light,
turn left onto ELKRIDGE LANDING Rd
Holiday Inn BWI will be 1 mile on left.

Local Repeater Talk-In
Maryland FM Association WA3DZD repeater network has given premission to use
their system for the talk-in on Saturday morning, October 11, 1997 and for
use during the conference weekend. The frequecies are:

* 146.76 out, 146.16 in
* 224.76 out, 223.16 in
* 444.00 out, 449.00 in

The talk-in station will be using the call sign W3NSA.

Many thanks to the Maryland FM Association.

Tucson Amateur Packet Radio
8987-309 E Tanque Verde Rd #337 * Tucson, Az * 85749-9399 * 940-383-0000
---
e-mail: tapr@tapr.org ftp: ftp.tapr.org web: <http://www.tapr.org/>
---

129. [TACGPS:689] Re: TAC32 Version 1.0.9 available

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Tue, 30 Sep 1997 18:28:25 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCCDD6.7D58D380.rick@cnssys.com>
Rendered body type: text/plain

Tom,

I increased the date field window size. This should fix the problem. I have
loaded the new release on http://www.cnssys.com/tac32 . This is still
Version 1.09. There are no functional changes.

For the expert ftp'er who has already installed tac32 from the Web site at
least once, the three files in ftp://ftp.cnssys.com/pub/tac32 can de
downloaded to replace the same three files in your installed directory
(typically "C:\Program Files\CNS Systems\TAC32". This will save a lot of
on-line time but is more prone to error. You don't get the DLLs or the
system configuration check that you get with the automatic install from the
Web site. Don't do it unless you are confident.

Rick
WB2TNL

-----Original Message-----
From: Tom Clark (W3IWI) [SMTP:clark@tomcat.gsfc.nasa.gov]
Sent: Wednesday, September 24, 1997 10:29 PM
To: tacgps@tapr.org

Subject: [TACGPS:682] Re: TAC32 Version 1.0.9 available

Rick -- 1.0.9 lost part of the date field here -- month & year on the
2nd
line. I see you included my "extended" Maidenhead calculation from
SHOWTIME (the .75 part of FM19me.75).

Tom

October 1997

Original source file: tacgps.9710
Source: http://ftp.tapr.org/product_docs/TAC2/mail_archives/tacgps.9710

1. [TACGPS:690] Re: TAC32 Version 1.0.9 available

From: bsmeds@esoc.esa.de
Date: Wed, 1 Oct 1997 03:01:21 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <C1256523.002A4D4A.00@esocmail1.esoc.esa.de>
Rendered body type: text/plain

I have tried to download the software from http://www.cnssys.com/tac32 but
get an error message
"Install from The Web Error. Invalid command line option. Contact the
Webmaster ....
Is it possible to obtain the full TAC32 software from the FTP site instead
of using the "Install from The Web."?
Boris

rick @ cnssys.com
97-10-01 01:28

Please respond to tacgps@tapr.org

To: tacgps @ tapr.org
cc: (bcc: Boris Smeds/esoc/ESA)
Subject: [TACGPS:689] Re: TAC32 Version 1.0.9 available

Tom,

I increased the date field window size. This should fix the problem. I have
loaded the new release on http://www.cnssys.com/tac32 . This is still
Version 1.09. There are no functional changes.

For the expert ftp'er who has already installed tac32 from the Web site at
least once, the three files in ftp://ftp.cnssys.com/pub/tac32 can de
downloaded to replace the same three files in your installed directory
(typically "C:\Program Files\CNS Systems\TAC32". This will save a lot of
on-line time but is more prone to error. You don't get the DLLs or the
system configuration check that you get with the automatic install from the
Web site. Don't do it unless you are confident.

2. [TACGPS:691] GPS30PC Group Purchase Update

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Wed, 1 Oct 1997 13:32:49 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <v03110730b05845d4c09d@[208.134.134.40]>
Rendered body type: text/plain

Hello everyone, a brief update on the GPS30PC group purchase.

We are expecting the units to arrive from Garmin end of this week and will
begin to ship the 250 ordered units out starting soon after.

Support for the GPS30PC will be done using the TACGPS list.

See everyone at the DCC in 10 days or so!
http://www.tapr.org/dcc

Cheers - Greg Jones, WD5IVD

Greg Jones, WD5IVD
Austin, Texas
wd5ivd@tapr.org
http://www.tapr.org/~wd5ivd

3. [TACGPS:692] ONCORE BASIC Documentation Error

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Wed, 1 Oct 1997 16:18:16 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3432BBF6.2A36@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Jim, W6SC wrote:
>
> Hello Tom,
>
>   I am a new user of TAC-2 and I'm having a problem. I have
> loaded the board according to the instructions and now I seem
> to have a rock vs. hard spot situation. I'm using the old
> Motorola ONCORE BASIC receiver (because I have one in hand)
> and with P4 loaded on the BACK of the board, there is no way
> to connect to the receiver with IDC cable/connectors so that
> the connections come out correctly. Is there an error in the
> instruction sheet that comes with the TAC-2? I find that by
> loading the connector P4 on TOP of the board, all would be
> well. I haven't done that yet as I would like to hear from
> you first. Also (this may be the heart of the problem), I
> did not receive the "one-inch IDC cable" referred to in the
> instructions, for connecting the TAC-2 to the receiver. I
> don't know if I was supposed to specify the type of receiver
> I was using when I ordered the kit from TAPR, but they didn't
> ask and I didn't tell (!). So before I connect the TAC-2 to
> the receiver I need to get this resolved. I'm anxious to get
> started with it as I am in a "clock lab" and can put it through
> its paces. Thanks, Tom.
>
>   73,
>
>   Jim Johnson W6SC
>   Hewlett-Packard Laboratories
>   Palo Alto, CA
>
>   Work: jjohnson@hpl.hp.com
>   Home: jjoker@dxhound.com

Hi Jim -- Yes, for the old original ONCORE BASIC (PVT-6) the 2x5
header at P4 MUST be installed with the pins pointing up, on the
top side of the board. I see on Page 7 of the "build" documentation
that it says "bottom". I designed the board with the pins "up" and
I have tested it thattaway. So the flaw is in the documentation.

I'm not sure when the error crept in. I thought I had reviewed it
in my early version of the docs, but I may have missed the error.
Or it may have been missed when the docs were made "pretty". When
the project finally came to fruition, I was out of the country and
only pulled a set of the final words off the web a week ago.

Regarding the "1 inch IDC cable" -- since there are so few of the
antique PVT-6's around anymore, I think that the TAPR decision was
to have that cable in the "if you need this, you should get your own"
options list (like we did with the batteries), but perhaps Greg can
respond. If you don't have the ability to do make the cable, send
me an Email and I'll send one to you.

Thanks for the report -- 73, Tom

4. [TACGPS:693] libONCORE

From: mdf@angoss.com (Matthew Francey)
Date: Thu, 2 Oct 1997 14:39:23 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199710021929.TAA20323@hydrogen>
Rendered body type: text/plain

I have a tentative library written in C++ which speaks Motorola
Binary Format. If all of the following conditions apply:

1) You aren't afraid of running Linux.
2) You have g++ 2.7.2.1 (or greater)
3) You have a GPS receiver which speaks "Motorola Binary" (I use the
   Oncore VP).
4) You have a TAC-2, or, equivalently, a 1PPS signal on the carrier-detect
   line of the serial cable.
5) You are interested in this kind of thing.

Then send me mail and I'll send you a copy of the library and some
trivial applications (including a minimalist "showtime") that uses it.

5. [TACGPS:694] Re: libONCORE

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Thu, 2 Oct 1997 14:59:17 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <v03110714b059aab256b0@[208.134.134.40]>
Rendered body type: text/plain

Why don't you do up a ZIP file and a text file for it and put it in the
TAPR software_lib upload area and let me know and I'll move it over to
TAC-2 area.

Cheers - Greg

>I have a tentative library written in C++ which speaks Motorola
>Binary Format. If all of the following conditions apply:
>
>1) You aren't afraid of running Linux.
>2) You have g++ 2.7.2.1 (or greater)
>3) You have a GPS receiver which speaks "Motorola Binary" (I use the
>   Oncore VP).
>4) You have a TAC-2, or, equivalently, a 1PPS signal on the carrier-detect
>   line of the serial cable.
>5) You are interested in this kind of thing.
>
>Then send me mail and I'll send you a copy of the library and some
>trivial applications (including a minimalist "showtime") that uses it.

Greg Jones, WD5IVD
Austin, Texas
wd5ivd@tapr.org
http://www.tapr.org/~wd5ivd

6. [TACGPS:695] Up and running

From: "James L. Johnson" <jjjohnson@saiph.hpl.hp.com>
Date: Thu, 2 Oct 1997 18:18:32 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199710022310.AA085283848@saiph.hpl.hp.com>
Rendered body type: text/plain

Hello,

   I am a new user of the TAC-2 and am getting my feet wet with it.
It's up and running and I'm reading the manual as I try to figure
out what all the "buttons" do. It's clear Tom Clark has put a great
deal of effort into this project and the results are certainly
worth the effort.

   When I become a little more familiar with all of its features, I'm
going to measure the accuracy of the clock using the 1PPS output port
(P3) as the reference port from which to measure. My receiver is the
old PVT-6 with Ver. 5.0 software. Our local house standard is within
25 nsec of UTC(USNO), so I should be able to get a good reading on
this PVT-6/TAC-2.

   More later ....

   Jim W6SC
   jjohnson@hpl.hp.com

7. [TACGPS:696] Re: Up and running

From: clark@tomcat.gsfc.nasa.gov (Tom Clark -- W3IWI)
Date: Fri, 3 Oct 1997 08:36:30 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <38925@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Jim -- glad we got the connector problem sorted out. If your firmware is
really 5.0 there may be a ~10-20 nsec bias error -- it was there in the
5.beta release, and fixed by (I seem to recall) 5.1 or 5.2.

Regarding the "buttons" -- I strongly advise that you use the Quick-start
"cookbook" -- it may be in the documentation you got, but if it isn't, then

fetch, read & heed the material in the file "success.tac" on my aleph file
server at URL
     ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/success.tac

All the results showing TAC performance that are shown in the .gif files
on aleph were obtained with 6-channel PVT-6's (most with 6.x firmware) since
that was what was available when I started the project and all ~50 of the
original TACs went out the door with the 6-channel units. It was only with
the TAC-2 that I supported the newer ONCORE VP's, nearly all of which are
8-channel units [I have one 6-channel VP, and I've seen an 8-channel ONCORE
BASIC -- (BASIC being the new name for the PVT-6) -- so the correspondence
between the older/newer hardware vs. 6/8 channels isn't perfect].

If you follow my cookbook and do fairly long time-interval averages, I can
give you a 99-44/100% guarantee that you'll hit the 30 nsec mark. FYI --
Robin Giffard's HP58501 "smart clock" uses the same ONCORE VP, and it also
achieves similar performance (except that we've seen occasional 100 nsec
epoch jumps, presumably due to the way that he steers the 10.00 MHz xtal).

73, Tom

---

8. [TACGPS:697] Re: Up and running

From: "James L. Johnson" <jjjohnson@saiph.hpl.hp.com>
Date: Fri, 3 Oct 1997 11:16:44 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199710031613.AA035445190@saiph.hpl.hp.com>
Rendered body type: text/plain

>
>
> Jim -- glad we got the connector problem sorted out. If your firmware is
> really 5.0 there may be a ~10-20 nsec bias error -- it was there in the
> 5.beta release, and fixed by (I seem to recall) 5.1 or 5.2.
>
> Regarding the "buttons" -- I strongly advise that you use the Quick-start
> "cookbook" -- it may be in the documentation you got, but if it isn't, then
> fetch, read & heed the material in the file "success.tac" on my aleph file
> server at URL
>   ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/success.tac

Thanks Tom, I'll check all this out ASAP.

>
> All the results showing TAC performance that are shown in the .gif files
> on aleph were obtained with 6-channel PVT-6's (most with 6.x firmware) since
> that was what was available when I started the project and all ~50 of the
> original TACs went out the door with the 6-channel units. It was only with
> the TAC-2 that I supported the newer ONCORE VP's, nearly all of which are
> 8-channel units [I have one 6-channel VP, and I've seen an 8-channel ONCORE
> BASIC -- (BASIC being the new name for the PVT-6) -- so the correspondence
> between the older/newer hardware vs. 6/8 channels isn't perfect].
>
> If you follow my cookbook and do fairly long time-interval averages, I can
> give you a 99-44/100% guarantee that you'll hit the 30 nsec mark. FYI --
> Robin Giffard's HP58501 "smart clock" uses the same ONCORE VP, and it also
> achieves similar performance (except that we've seen occasional 100 nsec
> epoch jumps, presumably due to the way that he steers the 10.00 MHz xtal).

Funny you should mention Robin Giffard ... he sits right next to me :-)

  Thanks again and I will be moving forward with this! More later ....

  73,

  Jim W6SC

---

9. [TACGPS:698] W3IWI Doccumentation Changes?

From: "Rosenberg.Eric"<rosenberg.eric@orbcomm.com>
Date: Fri, 3 Oct 1997 13:15:28 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <9710038758.AA875899443@occgate.orbcomm.com>
Rendered body type: text/plain

Last week, Tom mentioned that his TAC-2 documentation was different
     than that which TAPR sent out and had on the web. He also posted new
     schematics at his ftp site.

     Has this material (new manual, new drawings) been integrated into the
     TAPR docuemtnation?

Thanks,

Eric W3DQ

---
new email address: rosenberg.eric@orbcomm.com

10. [TACGPS:699] Next Weekend's TAPR/ARRL Digital Conference

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Sat, 4 Oct 1997 14:06:30 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3436837B.6F5@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Greg (WD5IVD) has posted a lot of information on next weekend's Digital conference. If you've missed it, everything you want to know is on the TAPR web site at URL

http://www.tapr.org

For thos of you who are coming, I thought I might recommend a couple of other "tekkie" attractions close to the conference site.

(1) The National Security Agency (NSA) has established the National Cryptological Museum (NCM) which is really amazing. The give a lot of history on cryptology in peace and war, and even show some of the NSA current activities. They have the hardware from several generations of the Moscow/Washington "Red Phone" hotline. They show a number of versions of the German Enigma, Japanese Purple, and British/USA Bombe machines.

For me the most fascinating attraction is that they have a working German Enigma that you can try (with, unfortunately, a few burned-out light bulbs).

To reach the NCM, note on your map that the Balto/Wash Parkway is adjacent to the site of the conference. Proceed south on the BWP to Maryland Rt.32 and turn east (marked Fort Meade -- NOT towards Columbia). About 500 feet east of the BWP, turn left (north) onto a road marked "Colony 7 Drive" and follow it to the museum. [FYI, Colony 7 used to be a motel. NSA got squeemish over having a motel so close to their sacred turf so they bought it, and then turned it into a museum].

The NCM hours are
- weekdays: 09:00 - 15:00
- Saturday: 10:00 - 14:00
- Sunday: closed

For anybody interested in digital communications, the NCM is a MUST!

(2) Further south, just off the BWP, is NASA Goddard Space Flight Center. GSFC has a nice Visitor's Center that has real leftover satellites, descriptive material about NASA and GSFC's missions, and even a real moon rock.

The easiest way to reach the GSFC Visitor's Center from the DCC site is to proceed south on the BWP. After the Rt.32 exit mentioned above, you will pass thru Md.198 and Md.197 exits (warning!! Construction delays possible) and the next exit will be Powder Mill Rd. Take this exit and at the end of the ramp turn left (east) onto Powder Mill. About 500 feet up this road, turn right(south) onto Soil Conservation Road and proceed ~2 miles. Just before the 1st traffic light (which runs only during workdays) you will see the GSFC's club station, WA3NAN on your left -- if the gate is open, stop in and say hello. Another few hundred feet down the road is a 2nd traffic light -- turn right, and then immediately turn left before you come to the guard shack -- this will take you directly to the GSFC visitor's center.

Hours: Tuesday - Sunday: 10:00 - 16:00

Hope you find these added attractions interesting -- 73, Tom

11. [TACGPS:700] DCC info: GPS Coordinates

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Sat, 4 Oct 1997 14:56:22 -0500 (CDT)
To: tacgps@tapr.org

Message-ID: <34369099.1CAB@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

After posting my message about the additional attractions available
for those coming to next weekend's DCC, I was asked to supply GPS
coordinates -- so here they are:

Nat'l Crypto Museum: N39D 06.89M W076D 46.50M
WA3NAN: N38D 59.92M W076D 50.84M
GSFC Visitors Center: N38D 59.62M W076D 50.70M

73, Tom

12. [TACGPS:701] TAC32 for Garmin

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sun, 5 Oct 1997 17:12:31 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCD1BA.06847EC0.rick@cnssys.com>
Rendered body type: text/plain

Tom,

Thanks to Lyle I now have a Garmin receiver up and running. I built one of
the boxes I showed you Friday and mounted the TAC=-2 and Garmin in it.
 After a few hours the Garmin found itself and began operating normally.

This allowed me to debug the TAC32 software. I was able to quickly find
the problem and correct it. The result is that the validity tests I used
for NMEA messages have been dramatically improved across the board for all
receivers and some specific Garmin-related issues have been resolved.

I also retrieve the Garmin proprietary message which allows me to display
the receiver-specific data such as software revision, self test results and
internal temperature.

I have one problem which I would like to solve before releasing the latest
software, however. The Garmin is reporting some very high signal-to-noise
numbers in the $GPGSV message. 30 to 50db is typical which is perhaps 20db
more than reported by the Motorola in the same message. However, I see in
Showtime that you have the following code:

'make 20 dB normalization correction for Garmin:
                sats(i).snr = DataV(a$, p) + 20 * (ApType = 5)

which appears to ADD 20db to the values reported by the Garmin in the
$GPGSV message. ApType = 5 is Garmin, right? Something does not seem
right here. Perhaps you can clarify this before I spend hours comparing
the results of Showtime and TAC32 against the Motorola and Garmin
receivers.

Rick

13. [TACGPS:702] Re: TAC32 for Garmin

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Sun, 5 Oct 1997 21:58:25 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3438441D.1D0D@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Rick -- Yes the Garmin returns S/N values in the $GPGSV message
that seem to be ~20 dB higher than Motorola does, so SHOWTIME
corrects for this by SUBTRACTING 20 dB when ApType=5.

The reason that you are confused is that in QuickBasic, the
IF test returns a signed 4-byte number = FF if true and =00
if false. However an FF is equal numerically to -1 in their
signed notation. Therefore my code which says

      sats(i).snr = DataV(a$, p) + 20 * (ApType = 5)

SUBTRACTS 20 dB when (ApType=5)

Tom

14. [TACGPS:703] Re: GPS disciplined OCXO

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Sun, 5 Oct 1997 23:14:51 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <34385541.5AB6@tomcat.gsfc.nasa.gov>

Rendered body type: text/plain

I'm copying this note I got from Brooks Shera (W5OJM)to the TACGPS
group since it seems relevant to our deliberations. (Brooks -- TACGPS is
a mail exploder that goes to many of the folks who have gotten my TAC-2
from TAPR and who are interested in time/frequency issues.)

FYI to all -- it is my plan to present a brief review of my current TOC
(for Brooks -- that stands for "TAC Oscillator Controller" following
the naming humor I initiated with the TAC) thought at next weekend's
TAPR/ARRL Digital Communications Conference as a part of the 20 minute
slot I have Saturday afternoon. In fact, I just finished printing out
my block diagram and checked my Email to find Brooks's message.

> Hello Tom,
>
> I recently came across your TAC web page on the TAPR site and mention
> of your GPS-disciplined oscillator project.
>
> Since I have similar interests I thought I would make contact with you.
>
> I am presently writing an article for QST (they have seen a draft and seem
> to like it) on a circuit I have put together to discipline an OCXO using
> the 1 pps GPS ticks.
>
> The circuit has the structure of a conventional phase-locked loop. The
> phase detector is a gated 25 MHz counter. The loop filter is implemented
> as an IIR digital filter in a PIC16C73 micro, which also controls the
> whole operation and provides a front panel display and ASCII output so
> a terminal program or whatever can monitor what's going on. The
> latter is very handy, especially for debugging.
>
> The PIC drives an 18-bit DAC to control the VCO. The tricky part,
> at least for me, was to get an IIR filter design that could accommodate to
> a variety of VCO sensitivities and qualities (drift rates). Since I
> want the circuit to be useful for a range of situations I felt this was
> important.
>
> The circuit consists of about 10 IC's, including the PIC, and the parts
> cost is about $40, w/o power supply, display and VCO.
>
> Performance is good, I think. With a quality OCXO I presently get an
> Allan variance of about 1.2E-12 for 1 hr, and about 4.3E-13 for 3 hours.
> For 10 minutes it is 7E-12. Since I don't have a Cs oscillator these
> values were estimated relative to the long term stability of GPS
> itself by observing the VCO control voltage. A questionable procedure
> perhaps; a better estimate could be made by comparing several independent
> oscillators but I haven't done it yet.
>
> If you are interested I could send you a graph or two of some of the
> data.
>
> The GPS rcvr used for the above tests was a Motorola PVT6 in position-hold
> mode. The second-to-secoond standard deviation is typically 25-30 nsec.
> Of course the effect on the VCO is much less because of the long
> time constants of the IIR filter. Ditto jitter due to SA, the
> atmosphere, phase
> measurement errors, GPS rcvr clock quantization, and all the other
> stuff I worried about when I started the project!
>
> I am presently looking for a source of reasonable price/quality OCXO's
> to suggest in the QST article. Any ideas?
>
> I would be interested in any comments you may have and if you would be
> willing to comment on a draft of the QST article since you are clearly
> knowledgeable on GPS and related matters.
>
> Also, if I can be of any help in your disciplined VCO project I would be
> happy to collaborate.
>
> 73,
>
> Brooks Shera, W5OJM
> Santa Fe, NM
> (505) 473-2101
> ebs@lanl.gov

Brooks -- I have been sidetracked from making a lot of progress on the
detailed
design because I was out of the country much of the summer ("Work is the

curse of the drinking class!") and because we have been trying to get
the
TAPRized version of my TAC out to the community. If you haven't seen
what
we have been doing on the TAC-2, check out the TAPR web page at URL
http://www.tapr.org and then click on the "W3IWI/TAC-2" button.

As I gather you have seen, my initial efforts concentrated on getting a
good performing GPS-based clock. With my original TACs, we routinely get
10-30 nsec RMS performance against atomic standards all over the world
(see my FTP site at
ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/
and then look at some of the .GIF plots if you haven't seen them).

Now that the TAC is out the door, TAPR plans that the next step is the
TOC.
I designed the new TAC-2 circuit board with lotsa hooks to make the TOC
work
as a piggy-back board.

It sounds like our basic design ideas are similar. I was interested to
see you
are using an 18-bit D/A. My ideas called for similar resolution, but
achieved
slightly differently. Lyle Johnson (WA7GXD) and I have been thinking
along the
lines of using BCD rate multipliers. Six decades of them cascaded
together
produce a digital waveform with anywhere from 1 to 999999 pulses each
second
when driven from a 1 MHz source, and with the pulses well distributed
thru
the second. This waveform can be integrated with a many second time
constant
to produce a nearly perfect, guaranteed monatonic, D/A converter. And it
turns
out that you can also use the rate multiplier as a part of the
count-down
divider chain for the standard.

We made a first cut and decided that nearly all the logic could be fit
into
a common, cheap FPGA, with only the microprocessor and the analog signal
conditioning parts not in the FPGA [Lyle -- I did some re-defining on
what
needs to go into the FPGA -- we need to talk soon!].

For a TAPR project, we need to design for reproducability. As a result,
I've
tended to stay away from having the project based on any "Gee, I picked
up this
great frequency standard at Dayton" type of parts (personally, I've
collected
several really great xtals and a couple of Rb's over the years in just
that
way). So your comment on needing to find a good, cheap, readily
available xtal
strikes very close to home. It is one of the things that several of us
have
been trying to do also. (Lyle -- you had a lead on a fairly good xtal --
but
I haven't heard any comments from you on it. Any news?).

Brooks -- I see that you have been using an OCXO. My analysis shows that
the
performance we can achieve in the 1 minute to a few hour range is
essentially
defined by the crystal's inherent stability, and that on those times
scales,
temperature is the dominant forcing factor. An OCXO would be nice, but a
good
oven (one that will hold the temperature of the xtal to better tha 1C)
adds a
lot to the cost. I see the selection of a suitable commercial oscillator
(or the
design of a good oven to stabilize a cheap oscillator, or the addition
of
temperature to the disciplining equation) as mandatory. If any of the
TACGPS

folks can help with this problem, please speak up!

Recently I did some work to measure the Allan Variance of the HP58503 GPS
disciplined oscillator (which also uses the ONCORE). It's a pity, 'cuz HP
no longer supplies instruction manuals with schematics 'cuz it seems that
it suffers badly from a D/A converter with inadequate resolution, and from
the microprocessor trying to steer the xtal too violently; as a result, the
shorter period stability (< 1000 seconds) suffers.

Just Friday I was doing some work on composite Allan Variances to try to
define the problem better. The (conservative) model AV curve I came up with
had these values (I spliced your results into my table):

T	Typical TACGPS	GPS+ GoodXtal	GPS+ CheapXtal	GPS+ Rb	Brooks' Message
1 sec	5.0E-08	5.0E-12	5.0E-11	6.0E-12	
10 s	4.0E-09	5.0E-12	2.0E-10	5.0E-12	
100 s	3.0E-10	1.5E-11	8.6E-10	6.0E-12	
600 s					7.0E-12@10m
1000 s	2.5E-11	4.8E-11	1.0E-10	7.4E-12	
3600 s					1.2E-12@1h
10000s	2.0E-12	3.0E-12	4.0E-12	2.7E-12	4.3E-13@3h
10e5 s	2.0E-13	2.0E-13	2.0E-13	2.0E-13	
10e6 s	2.0E-14	2.0E-14	2.0E-14	2.0E-14	

I'm a bit surprised that your results come in about an order-of-magnitude
better than my estimates of what we can do. We should discuss your methodology
(especially at munching the numbers) and I need to review my model !!
;<}

For Steve/Greg -- it sounds like we need to merge Brooks efforts into
ours -- especially if he is so close to having a finished product!
(Brooks --
this is a comment directed to the TAPR management).

A few final comments -- because my idea was to make the TOC work with
a wide range of oscillators, running from (relatively) cheap xtals all the way
up to Rb's, I envisioned the software filter program allowing for a wide range
of parameters. My idea was to make it have some sequential estimation capability
with "dynamic filters" (which may be Kalmann filter, or maybe adaptive least-
squares fitters). I had hoped to allow for additional state variables (like
xtal temperature and aging) in the estimator, but that is TBD. Brooks used
a PIC. My initial choice was a Basic Stamp 2, but I'm having second thoughts
that a more capable processor might be a good idea.

Brooks -- do you want to be added to the TACGPS list?

Comments from anyone?

73, Tom

15. [TACGPS:704] TAC32 Version 1.0.10 for Garmin

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Mon, 6 Oct 1997 08:33:48 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCD23A.31E5A140.rick@cnssys.com>
Rendered body type: text/plain

TAC32 Version 1.0.10 is now available on http://www.cnssys.com/tac32

This release incorporates the changes needed to get the Garmin GPS receiver
working correctly.

Also in this release is a menu item under "Data" which allows you to chose

to synchronize the PCs clock to TAC32 continuously, set the PC clock only
one time, or to disable setting the PC clock from TAC32.

A variety of minor bug fixes are also included.

Rick
WB2TNL

16. [TACGPS:705] Re: TAC32 Version 1.0.10 for Garmin

From: "Ronald G. Parsons" <w5rkn@amsat.org>
Date: Mon, 6 Oct 1997 10:03:55 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3438FD61.11EADE4D@amsat.org>
Rendered body type: text/plain

Have you incorporated yet the choice of RS-232 lines that TAC32 looks at for
the 1 pps signal. E.g., lines other than DCD?

Ron

Richard M. Hambly wrote:
>
> TAC32 Version 1.0.10 is now available on http://www.cnssys.com/tac32
>
> This release incorporates the changes needed to get the Garmin GPS receiver
> working correctly.
>
> Also in this release is a menu item under "Data" which allows you to chose
> to synchronize the PCs clock to TAC32 continuously, set the PC clock only
> one time, or to disable setting the PC clock from TAC32.
>
> A variety of minor bug fixes are also included.
>
> Rick
> WB2TNL

--
Ron W5RKN

also:
rparsons@bga.com

17. [TACGPS:706] Re: TAC32 Version 1.0.10 for Garmin

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Mon, 6 Oct 1997 10:17:15 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCD248.D6A5CE40.rick@cnssys.com>
Rendered body type: text/plain

Ron,

Not yet but I will do that soon.

Rick

-----Original Message-----
From: Ronald G. Parsons [SMTP:w5rkn@amsat.org]
Sent: Monday, October 06, 1997 11:04 AM
To: tacgps@tapr.org
Subject: [TACGPS:705] Re: TAC32 Version 1.0.10 for Garmin

Have you incorporated yet the choice of RS-232 lines that TAC32 looks at for
the 1 pps signal. E.g., lines other than DCD?

Ron

Richard M. Hambly wrote:
>
> TAC32 Version 1.0.10 is now available on http://www.cnssys.com/tac32
>
> This release incorporates the changes needed to get the Garmin GPS receiver
> working correctly.
>
> Also in this release is a menu item under "Data" which allows you to chose
> to synchronize the PCs clock to TAC32 continuously, set the PC clock only
> one time, or to disable setting the PC clock from TAC32.
>
> A variety of minor bug fixes are also included.
>

> Rick
> WB2TNL

--
Ron W5RKN

also:
rparsons@bga.com

18. [TACGPS:709] Re: GPS disciplined OCXO

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Mon, 6 Oct 1997 14:05:33 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3439366D.1DA6@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Concerning my posting from last nite -- perhaps some of you would like
to see my Allan Variance curves (slightly revised from the data in
last nites text posting -- I reviewed the performance of several of
the oscillator types today) on different types of frequency standards.
I prepared this curve for next week-ends TAPR/ARRL DCC.

Go to my ftp file server at URL

  ftp://aleph.gsfc.nasa.gov/GPS/tapr_dcc/

and fetch the allanv plot in either .gif, .jpg or postscript formats.

For those of you not familiar with Allan Variance, it is essentially
the RMS fractional error in either time or frequency between a
a measurement now and a measurement T seconds from now; it is
normally plotted on a log-log plot. If a clock is uncertain by
100 nsec after 10000 sec=3 hours have passed, then it would have
a fractional uncertainty of 1.0e-11. To make a measurement repeatable
to 1 Hz at 1GHz in 1 second requires a stability of 1e10-9 at one
second. For your wrist-watch to be trusted to 1 second after 10
days, the crystal in it must be good at the 1e10-6 level. Etcetera.

The dashed lines on the plot show the performance of two different
flavors of Cesium standards (mortal and the HP Super-CS) and the
typical performance of the Hydrogen Masers I use all the time.

The plot shows the performance of a typical (and healthy) Rubidium
standard (like an HP 5061) and 2 different grades of crystals. The
"good" crystals are intended to be high-quality OCXOs (like HP10514)
of the type that are used in Cs & Rb standards; The reason that so
many standards look nearly identical out to 10-100 seconds is that
the short-term stability of any of the atomic standards is that of
the crystal in the unit. There are "better than good" xtals, but
they tend to cost several thousand bux.

The "Cheap Xtal" line is my judgement of the performance of a fairly
good, but mortal crystal (i.e. a $10-$20 non-ovenized unit). You'll
notice that all xtals are better than 1e-10 at one second. A harmonic
from even a cheap crystal-can xtal makes a clean, but warbling sound
at the 10 GHz amateur band! The cheap xtals "take off" at times longer
than a minute -- this is often due to changes in temperature and is
the reason that higher quality oscillators are either TCXOs or OCXOs.

Also, on the plot I have put my measured Allan Variance for the
ONCORE version of the TAC when running in optimum timing mode. At
1 sec, we see an RMS jitter in the 50 nsec range, going down to ~20
nsec for long averaging times; the ~20 nsec is also indicative of
the day-to-day performance of the GPS constellation. Therefore, the
line shown for the TAC is simply [(20 to 50 nsec)/T].

Finally on the plot is shown my estimate of the performance that can
be achieved if GPS is used to "steer" or "discipline" another
oscillator. For this to work, both Brooks & I have shown that you
want to "hand-off" from the xtal to GPS with a loop time constant
about equal to the time at which the Allan Variance for the two
cross each other. For a cheap xtal, this is 1-2 minutes. For a good
xtal, its about an hour. And if you want to discipline a Rubidium
standard, the hand-over is around 3-5 hours. With this in mind,
I added curves to the figure which are indicative of the composite
Allan Variance performance that should be achievable. While Brooks'
7e-12 at 10 minutes looks about right, to me his 1e-12 at 1 hour and
4e-13 at 3 hours look optimistic by a factor ~5.

Comments?

73, Tom

19. [TACGPS:710] Re: GPS disciplined OCXO

From: Brooks Shera <ebs@lanl.gov>
Date: Mon, 6 Oct 1997 14:35:20 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199710061934.NAA17775@newreg.lanl.gov>
Rendered body type: text/plain

Tom

A short(?) reply 'til I get a chance to look over my Allan variance
measurements.

>It sounds like our basic design ideas are similar. I was interested to
>see you
>are using an 18-bit D/A. My ideas called for similar resolution, but
>achieved
>slightly differently. Lyle Johnson (WA7GXD) and I have been thinking
>along the
>lines of using BCD rate multipliers. Six decades of them cascaded
>together
>produce a digital waveform with anywhere from 1 to 999999 pulses each
>second
>when driven from a 1 MHz source, and with the pulses well distributed
>thru
>the second. This waveform can be integrated with a many second time
>constant
>to produce a nearly perfect, guaranteed monatonic, D/A converter. And it
>turns
>out that you can also use the rate multiplier as a part of the
>count-down
>divider chain for the standard.

I think this is a neat way to make a high precision DAC. You may want
to consider the additional phase shift introduced by the integration
in the total phase shift around the loop. If the total exceeds 180 deg
at a freq where the gain is >1, the loop will oscillate. For long
loop time constants your integrator shouldn't make any difference, I
think. However I find it handy to include a short time constant (~1 min)
in the filter to provide a "quick lockup" mode. In this case your extra
integration might cause oscillation.

The 18-bit DAC I have been using is a Burr-Brown PCM61P ($9.47 @ DigiKey).
It is designed for the audio trade and can drive +/- 3 volts and +/- 1 ma.
The +/- polarity and low output Z are handy for driving various VCO's.

It has a serial input so I just connect it to one of the serial ports on
the PIC 16C73. The serial input means it can easily be remoted, so it
can sit next to (inside to box of) the VCO it controls. This is important
when you consider that DC ground currents plus thermal EMF's can be
millivolts
and the DAC is trying to control at the few microvolt level. Also
someone might want to plug his standard oscillator into the GPS controller
to discipline it (bad dog!, bad dog!) onto freq. for a bit, then unplug
the serial line and take it away. The DAC will hold its setting.

The PCM61P is only spec'd monotonic to 16 bits, but, hey, what do you want
for 10 bucks.

>
>A few final comments -- because my idea was to make the TOC work with
>a wide range of oscillators, running from (relatively) cheap xtals all
>the way
>up to Rb's, I envisioned the software filter program allowing for a wide
>range
>of parameters. My idea was to make it have some sequential estimation
>capability
>with "dynamic filters" (which may be Kalmann filter, or maybe adaptive
>least-
>squares fitters). I had hoped to allow for additional state variables
>(like
>xtal temperature and aging) in the estimator, but that is TBD.

Good idea!

The IIR filter I have programmed into the PIC is the digital equivalent
of what is known in control systems parlance as an "active PI" filter.
This filter has the nice property that it "learns" the drift
rate of the oscillator it's controlling and compensates any linear drift,
such as maybe crystal aging, etc.

My (very limited) experience is that once the linear drift term is removed
the remainder looks pretty random, except for temperature variations.
I think your suggestion of incorporating a temperature term into the
discipline is well worth exploring and could, as you say, save the
cost of an oven.
>
>Just Friday I was doing some work on composite Allan Variances to try to
>define the problem better. The (conservative) model AV curve I came up
>with
>had these values (I spliced your results into my table):
>
>   Typical   GPS+   GPS+   GPS+   Brooks'
> T   TACGPS   GoodXtal CheapXtal Rb   Message
>1 sec   5.0E-08 5.0E-12 5.0E-11 6.0E-12
>10   s 4.0E-09 5.0E-12 2.0E-10 5.0E-12
>100 s 3.0E-10 1.5E-11 8.6E-10 6.0E-12
>600 s   7.0E-12@10m
>1000 s 2.5E-11 4.8E-11 1.0E-10 7.4E-12
>3600 s   1.2E-12@1h
>10000s 2.0E-12 3.0E-12 4.0E-12 2.7E-12 4.3E-13@3h
>10e5 s 2.0E-13 2.0E-13 2.0E-13 2.0E-13
>10e6 s 2.0E-14 2.0E-14 2.0E-14 2.0E-14
>
>I'm a bit surprised that your results come in about an
>order-of-magnitude
>better than my estimates of what we can do. We should discuss your
>methodology
>(especially at munching the numbers) and I need to review my model !!
>;<}

I will look at my measurements to see if I screwed up.
Interesting, the slope at large T is the same in your estimates and
and in my data. What you have is a big bump at 100-1000 sec.
Due to what in your model?
As you know the Allan varaiance vs time reflects the noise
spectrum of the oscillator. And in this case also the GPS signals.

I usually analyze my data using Mathematica. If it is useful
to you I could send the Mathematica expression I used to compute
the AV, and some data.

A related topic. In my attempt to define appropriate loop filter
time constants I looked at the autocorrelation function of GPS
signals from my rcvr. I expected to see correlations lasting
out to many minutes or maybe longer, but what I saw was that
correlation was down to the noise level beyond 2 or 3 minutes.
This short term correlation may be due to number crunching in the
rcvr. Any comment? Is SA so well randomized?

More later.

-Brooks, W5OJM

20. [TACGPS:711] Re: GPS disciplined OCXO

From: Wis Macomson <wis@sequent.com>
Date: Mon, 6 Oct 1997 15:37:12 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199710062036.NAA02240@sequent.sequent.com>
Rendered body type: text/plain

>
> A short(?) reply 'til I get a chance to look over my Allan variance
> measurements.
>
> [. . .]
>
> My (very limited) experience is that once the linear drift term is removed
> the remainder looks pretty random, except for temperature variations.
> I think your suggestion of incorporating a temperature term into the
> discipline is well worth exploring and could, as you say, save the
> cost of an oven.
>

> [. . .]

Brooks,

There are some pretty decent and relatively cheap IC temp sensors
around for measuring ambient (National Semi or Dallas Semi for
example) that should easily interface to a PIC. Let me know if I
can help.

Should we get a humidity sensor, too? :)

-wis
--
Wis Macomson
c/o wis@sequent.com

21. [TACGPS:712] Re: GPS disciplined OCXO

From: Brooks Shera <ebs@lanl.gov>
Date: Mon, 6 Oct 1997 16:25:25 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199710062124.PAA04784@newreg.lanl.gov>
Rendered body type: text/plain

Wis,

Sounds like a good way to go. Maybe use two sensors, one inside and
one outside a little insulated box containing the xtal oscillator.
That way we could measure the current temperature and what it
might be a little later. The PIC could do the arithmetic.

-Brooks

>There are some pretty decent and relatively cheap IC temp sensors
>around for measuring ambient (National Semi or Dallas Semi for
>example) that should easily interface to a PIC. Let me know if I
>can help.

22. [TACGPS:713] Re: GPS disciplined OCXO

From: Brooks Shera <ebs@lanl.gov>
Date: Mon, 6 Oct 1997 18:44:29 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199710062336.RAA21384@newreg.lanl.gov>
Rendered body type: text/plain

Hi Tom

I looked at the curves you referenced and thought about
the difference between your estimates and my observations.

My conclusion (at least at the moment):

Your GPS + xtal, etc curves all converge to the TACGPS curve,
which, as you say, is based on GPS jitter 20-50 nsec/T.

However, there is a difference between TAC and TOC.

These curves would be appropriate if you forced TOC oscillator
to exactly follow the GPS phase (like, I guess, TAC does).

But you don't. You have a low pass filter in the phase-locked loop
between GPS and the VCO. This filter's job is to reduce the GPS jitter
caused by noise and our friends at the DoD.

Thus the VCO sees less than 20-50 nsec of jitter and thus the asymptotic
Allan variance is better than for the TAC. ---could make a better TAC if
it had a filter, the TTAC? :-)

In my circuit the filter attenuation is about 23 db at frequencies
corresponding to about T = 1 hour (wonderful things, these digital
filters!). This moves your curve down into better agreement
with my observations. In fact a bit below them! I guess I have to
work harder.

Does this make sense?

-Brooks

>For those of you not familiar with Allan Variance, it is essentially
>the RMS fractional error in either time or frequency between a
>a measurement now and a measurement T seconds from now; it is
>normally plotted on a log-log plot. If a clock is uncertain by
>100 nsec after 10000 sec=3 hours have passed, then it would have
>a fractional uncertainty of 1.0e-11. To make a measurement repeatable
>to 1 Hz at 1GHz in 1 second requires a stability of 1e10-9 at one
>second. For your wrist-watch to be trusted to 1 second after 10
>days, the crystal in it must be good at the 1e10-6 level. Etcetera.
> [....]
>I added curves to the figure which are indicative of the composite
>Allan Variance performance that should be achievable. While Brooks'
>7e-12 at 10 minutes looks about right, to me his 1e-12 at 1 hour and
>4e-13 at 3 hours look optimistic by a factor ~5.
>
>Comments?
>
>73, Tom

23. [TACGPS:714] Very long acquisition time for GPS-20 ?

From: chrise@n0jcf.com (Chris Elmquist)
Date: Mon, 6 Oct 1997 21:24:32 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <m0xIP8k-000UNrC@n0jcf.com>
Rendered body type: text/plain

I've built a TAC using a GPS-20 module (from the first group buy) and
for the most part it works great. However, I am planning a road
trip in the near future and thought I'd take the GPS-20 in the vehicle
along with some Delorme software just to plot the trip as we go.

I checked the behavior of the receiver if power is lost (since it'll
be plugged into a switched cigarette lighter socket).. and I discovered
that it's taking as long as 20 MINUTES to acquire if power is removed
from the module for as little as one second !

What gives? Is this normal behavior? I thought the on-board battery
was supposed to keep things ticking (even if there's no incoming RF)
during brief outages like this.

For a mobile application, do I need to supply +5 all the time?

Thanks for any info.

73, Chris
--
Chris Elmquist, N0JCF
chrise@n0jcf.com
n0jcf@amsat.org

24. [TACGPS:715] Re: Very long acquisition time for GPS-20 ?

From: mdf@angoss.com (Matthew Francey)
Date: Mon, 6 Oct 1997 21:39:17 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199710070234.CAA01183@hydrogen>
Rendered body type: text/plain

Check the BBRAM option in the TAC-2 assembly manual. Without battery
back up, the receiver will loose all almanac, ephemeris, and other
tracking information -- hence long re-aquisition times as it starts
completely cold.

25. [TACGPS:716] Re: TAC w/ GARMIN GPS-20

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Mon, 6 Oct 1997 21:50:27 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <343994F8.5FE8@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

I had this inquiry from Chris Elmquist, N0JCF:
>
> Hi Tom...
>
> I've built a TAC using one of the GPS-20 modules from the TAPR group
> buy. I understand the issues which make it a second choice over

> say, the Moto ONCORE, but for keeping my Linux and Win95 machines on
> time I think it does the trick... except for this frusterating behavior:
>
> If the receiver looses power for even the briefest period-- say, just
> under one second, it will take 20 MINUTES before I see 1pps output
> again !! Horribly annoying.
>
> Did you see this kind of behavior when you played with the Garmin module ?
> The thing's got a battery on board which I thought would keep it ticking
> along through these kinds of brief outages.
>
> I'm quite certain I have good RF signal... I'm using an active patch up
> on the roof and SHOWTIME usually gives very large SNR numbers.
>
> Any idea what gives? Do I have a whacked module? Or is this the
> way it is??
>
> Thanks for any info...
>
> 73, Chris
> --
> Chris Elmquist, N0JCF
> chrise@n0jcf.com
> n0jcf@amsat.org

Chris, I'm copying your message to the TACGPS mailing list since they
might like
to see the reply too.

The GPS-20 is notoriously slow in locking up, but 20 minutes is a bit
too long.
The fundamental problem is that the -20 is only a 2-channel rcvr and it
sequentially samples the data from the satellites in view. If the S/N is
marginal, it really has to dig the signal out of the noise. I'd say that
2-5 minutes is a more normal lockup time.

It could also be that the BBRAM battery is flat and the rcvr is going
into a
whole sky search mode. In this mode, it has to acquire a complete GPS
satellite
almanac which can take ~13 minutes time. Check the battery voltage.

After a power hit, look at the NMEA messages coming out, especially
$GPGSA
and $GPGSV -- these will show the different satellites as it acquires
them.
The G-20 requires a minimum of 3 satellites before it can work to
determine
a 2-D position and its internal clock. The $GPGSV message has embedded
in it
the S/N ratio for the individual satellites. If the S/N's are less than
30-35,
then you are probably RF deprived!

In the TAC-2 I made provisions for a small UPS power supply using a 9-V
NiCd
battery to buffer power outages of a few minutes. It is also included in
the
schematic for my G-20 TAC emulator, which is included as a PostScript
drawing
in the file

    ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/emulate.zip

If you are working on software for the TAC in LINUX, you may want to
join the
TACGPS group. Also one of out people (Rick, WB2TNL) has an "alpha"
version of a
W95/NT program called TAC32 available (direct install from the web) from

    http://www.cnssys.com/tac32

TAC32 has the option to set the PC's clock once, or to continually keep
it
locked to the TAC. If you use Rick's TAC32 or my SHOWTIME, they both
have the
ability to let you monitor the NMEA messages, and both have dynamic S/N
displays
so you can see how your rcvr is doing [for both these packages, 20 dB is

subtracted from the G-20's reported S/N values, so you should see a
minimum
S/N of about 10-15].

Good to hear from you agin -- 73, Tom

26. [TACGPS:717] Re: GPS disciplined OCXO

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Mon, 6 Oct 1997 23:15:40 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3439A75F.2247@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Brooks Shera wrote:
>
> Hi Tom
>
> I looked at the curves you referenced and thought about
> the difference between your estimates and my observations.
>
> My conclusion (at least at the moment):
>
> Your GPS + xtal, etc curves all converge to the TACGPS curve,
> which, as you say, is based on GPS jitter 20-50 nsec/T.

First, let me be very precise in defining the AV curve for the TAC. It
represents my measured performance at each time span assuming that the
data
from the ONCORE has been heavily lo-pass filtered already -- with
integration
times comparable to the time span in question. For example, if you look
at
the plots H-Maser vs. TAC plots on my FTP site at

ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/

We see~104 nsec peak-to-peak jitter between individual 1 second points,
plus
short-term S/A effects giving 1 second pulse-to-pulse RMS ~ 50 nsec as
seen
in the file tac-1sec.gif, which in turn gives the 5e-8 value at 1
second.
Then at longer times, some of the results we've measured include

31 nsec with 30 second averaging (in oso-clk.gif)
31 nsec with 100 second averaging (in nr07-tac.gif)
30 nsec with 5 minute averaging (in gcgo-tac.gif)
24 nsec with 5 minute averaging (in arecibo-tac.gif)
9.4 (!) nsec with 2 hour average (in gcgo-tac.gif)

Other tests I've done show that a pretty, but conservative good error
model
(which is what I used for the AV curve I posted), based on the notion
that
you low-pass filter the GPS timing data to a good fraction of the stated
interval, is:

50 nsec @ 1 s = 5e-8
40 nsec @ 10 s = 4e-9
30 nsec @ 100 s = 3e-10
25 nsec @ 1000 s = 2.5e-11
20 nsec @ 10000 s = 2e-12

At 100,000 sec (1+ day) and 100,000 sec (~11 days), I note that the USNO
sees ~ 10 nsec scatter day-to-day for time derived from the entire GPS
constellation and the USNO Master clock (UTC(USNO)-GPS) as can be see
for
the past 30 days in the plot at URL
http://tycho.usno.navy.mil/gif/utcgps.gif

To be conservative (and because I really don't think we will use
multi-day
filters!) my TAC AV plot uses 20 nsec RMS at all time scales >= 10,000
sec.

OK -- so that's how I got the TAC AV curve.

> However, there is a difference between TAC and TOC.
>

> These curves would be appropriate if you forced TOC oscillator
> to exactly follow the GPS phase (like, I guess, TAC does).

No, the TAC values reported are straight out of Motorola's 1PPS port
(after suitable time-interval averaging in the measurement process).

> But you don't. You have a low pass filter in the phase-locked loop
> between GPS and the VCO. This filter's job is to reduce the GPS jitter
> caused by noise and our friends at the DoD.
>
> Thus the VCO sees less than 20-50 nsec of jitter and thus the asymptotic
> Allan variance is better than for the TAC. ---could make a better TAC if
> it had a filter, the TTAC? :-)

Here's where we seem to be diverging. My assumption on the TOC is that
we
time-lock the xtal (or Rb) to the 1 PPS signal derived from GPS. We do
this
with a very long time-constant that smooths out the higher frequency GPS
wiggles. If you want to think of it as a PLL, then we are phase locking
the xtal to GPS with time constants as long as hours -- i.e. with loop
bandwidths ~ 100 microHz.

The phase noise of the composite frequency standard can be no better
than
the xtal at short time intervals and can be no better than GPS over the
long haul.

The appropriate time constant in the loop is approximately equal to the
time interval at which AV curves for the two timing sources cross. My
simple-minded analysis (embodied in the composite AV curves) is that at
times a bit shorter than this, the GPS noise will degrade the xtal a
bit,
and that at longer times, the xtal will degrade the GPS a bit -- which
is why you see the hump. At long times, the composite will be steered
to match GPS, so it should approach the GPS performance asymtotically.

Recently I did some AV measurements on a commercial HP58503 unit vs one
of our H-Masers. Inside the 58503 is a (pretty good) HP10514 OCXO and an
ONCORE and a microprocessor. What I found was that at 1000 & 10,000 sec
it performed exactly like a TAC. At shorter times, it looked pretty much
like my composite "Good Xtal" model. However, it looks to me like HP is
"pushing" the xtal with GPS too hard and that their D/A converter lacks
the necessary resolution.

> In my circuit the filter attenuation is about 23 db at frequencies
> corresponding to about T = 1 hour (wonderful things, these digital
> filters!). This moves your curve down into better agreement
> with my observations. In fact a bit below them! I guess I have to
> work harder.
>
> Does this make sense?
>
> -Brooks

Afraid not -- like I hinted, I can't see how any magic filter can make
the composite any better than the two timing sources, and I still think
that the composite performance converges asymtotically to whichever is
better.

Boy -- this is getting to be fun again! Sure glad you joined us, Brooks!

73, Tom

27. [TACGPS:718] Re: Very long acquisition time for GPS-20 ?

From: Dave Martindale <davem@cs.ubc.ca>
Date: Tue, 7 Oct 1997 00:08:15 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <l03102002b05f7e687378@[198.162.38.159]>
Rendered body type: text/plain

>I checked the behavior of the receiver if power is lost (since it'll
>be plugged into a switched cigarette lighter socket).. and I discovered
>that it's taking as long as 20 MINUTES to acquire if power is removed
>from the module for as little as one second !
>
>What gives? Is this normal behavior? I thought the on-board battery
>was supposed to keep things ticking (even if there's no incoming RF)
>during brief outages like this.

>
>For a mobile application, do I need to supply +5 all the time?

I have a GPS-20 in a TAC-like device. Any interruption in the 5 V
supply causes the 20 to stop processing. The onboard battery is supposed
to provide power to a RAM that holds the current location and almanac,
and it might even keep the ephemeris data. There is also a CMOS clock
that provides an approximation of the current time. All this takes
a few microamps from the backup battery. The main CPU and RF section
does *not* run though - that takes over 100 mA!

When the power comes back on, even after a momentary interruption, the
20 has to re-acquire satellites. This can take on the order of 30
seconds to a minute if current ephemeris is saved and power is off
for only a short time (up to half an hour or so), or about 2-4 minutes
without ephemeris if the clock and almanac and last location are good.

20 minutes to acquire suggests that at least one of those has been lost.
When the 20 is running, it outputs a special status message mixed in
the NMEA data once a minute. There are fields in there that tell you
whether the saved almanac, etc are OK.

Another possibility: all Garmin GPSes seem to take longer to acquire when
they are moving, particularly if something interrupts the view of the
sky periodically (e.g. trees). This might make a 20 take a long time
to acquire even if it does have almanac and time info. Was the 20
moving at the time you did the experiment?

Anyway, the 20 is probably not an ideal choice of GPS board for mobile
applications. You could supply +5V all the time, but that's a lot
of battery drain when the car is parked. Yet if power is on only when
the ignition is on, you either need to sit in one place and wait for
the 20 to acquire, or drive away and wait even longer for acquisition.
Something like the GPS 25, with its parallel receiver, will acquire
much faster either stationary or moving.

        Dave

28. [TACGPS:720] TAC32 download

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Tue, 7 Oct 1997 12:20:43 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCD322.A3039100.rick@cnssys.com>
Rendered body type: text/plain

-----Original Message-----
From: Richard M. Hambly [SMTP:rick@cnssys.com]
Sent: Tuesday, October 07, 1997 11:12 AM
To: 'bsmeds@esoc.esa.de'
Subject: RE: TAC32 download

Boris,

I'm sorry I took so long to answer. I had some difficulty getting things
packaged and working correctly.

The primary means of installing new versions of TAC32 is to use the Web
page http://www.cnssys.com/tac32 This page will allow you to do a direct
installation to your machine and insures that you have all the correct DLLs
as well as the executable and help files. The DLLs are different for
Windows NT and Win95 but this is managed automatically by the installation
process. Once you have the DLLs the next installation will proceed faster
because they will not be downloaded again until I have an update (unlikely
until the compiler changes).

Here is an alternative for those who are having trouble with my
InstallFromTheWeb page. You can get the same automated installation by
downloading and running the file ftp://ftp.cnssys.com/tac32/tac32s.exe It
will take longer to download but it can be used to install to more than one
machine. It might even fit on a single floppy but that is getting less
likely as TAC32 grows.

There is a third alternative, recommended only at your own risk and ONLY if
you have installed TAC32 by one of the two methods above at least once on
the target machine. Since the DLLs rarely change, you can download the
executable and help files (Tac32.exe, Tac32.cnt, and Tac32.hlp from
ftp://ftp.cnssys.com/tac32 Use these three files to replace the previous
files wherever you installed them (default is "C:/Program Files/CNS
Systems/Tac32/"). This method takes about 1/5 the time of the methods

above and so is popular with Tom.

A final note for Windows NT users: You should install Tac32 from the Administrator account to get the DLLs where they belong. Users who wish to be able to set the clock need that privilege turned on. It is not necessary to activate a lot of other privileges to do this. Don't, for instance, give out Power User privileges just so they can set the clock! Anyone who needs help with this just drop me a note.

Rick
WB2TNL

-----Original Message-----
From: bsmeds@esoc.esa.de [SMTP:bsmeds@esoc.esa.de]
Sent: Monday, October 06, 1997 11:32 AM
To: Rick@cnssys.com
Subject: TAC32 download

Dear Rick,
I would like to try the TAC32 software but I cannot download it as described in
http://www.cnssys.com/tac32
Maybe it is due to our firewall.
Is it possible to get it as an attached zip file or to download from an FTP site?
Regards
Boris Smeds DJ0EX, SM0GJ

29. [TACGPS:721] Re: GPS disciplined OCXO

From: Brooks Shera <ebs@lanl.gov>
Date: Tue, 7 Oct 1997 12:20:56 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199710071718.LAA05135@newreg.lanl.gov>
Rendered body type: text/plain

Hi Tom

Your detailed reply was quite helpful in understanding the difference of about a factor 4 between your Allan variance estimates and my measurements.

The short version is I don't think there is any real discrepancy.

In comparing TAC and a H-maser you report:

>We see~104 nsec peak-to-peak jitter between individual 1 second points,
>plus
>short-term S/A effects giving 1 second pulse-to-pulse RMS ~ 50 nsec as
>seen
>in the file tac-1sec.gif, which in turn gives the 5e-8 value at 1
>second.
>Then at longer times, some of the results we've measured include
>
> 31 nsec with 30 second averaging (in oso-clk.gif)
> 31 nsec with 100 second averaging (in nr07-tac.gif)
> 30 nsec with 5 minute averaging (in gcgo-tac.gif)
> 24 nsec with 5 minute averaging (in arecibo-tac.gif)
> 9.4 (!) nsec with 2 hour average (in gcgo-tac.gif)

I assume the latter are rms values. (If they are pk-to-pk there is REALLY no discrepancy). I made a log plot of these, including the 1 sec point, and they are a nice fit to about T^-0.25. This projects to 4.5 ns for 1 day. Whooa, you say, cann't do better than 10 nsec according to USNO! So you concluded:

>To be conservative (and because I really don't think we will use
>multi-day
>filters!) my TAC AV plot uses 20 nsec RMS at all time scales >= 10,000
>sec.
>

Conservative. Fair enuf. But your own measurement at 2 hours was already twice that good. Half of discrepancy explained.

Now the other half. My original message said:

>>With a quality OCXO I presently get an
>>Allan variance of about 1.2E-12 for 1 hr, and about 4.3E-13 for 3 hours.
>>For 10 minutes it is 7E-12. Since I don't have a Cs oscillator these
>>values were estimated relative to the long term stability of GPS
>>itself by observing the VCO control voltage. A questionable procedure
>>perhaps; a better estimate could be made by comparing several independent
>>oscillators but I haven't done it yet.

In other words, in my values you won't see the 10 ns or whatever reported
by USNO. The two longer of my values quoted about correspond to an AV of
about 4 nsec/T. In view of the above, I think this is pretty good
agreement
with your H-maser data.

----------end of nit-picking----------

I have a couple of comments/questions.

>Here's where we seem to be diverging. My assumption on the TOC is that
>we
>time-lock the xtal (or Rb) to the 1 PPS signal derived from GPS. We do
>this
>with a very long time-constant that smooths out the higher frequency GPS
>wiggles. If you want to think of it as a PLL, then we are phase locking
>the xtal to GPS with time constants as long as hours -- i.e. with loop
>bandwidths ~ 100 microHz.

comment:

the reason I consider TOC a PLL is because the theory of PLLs has all
been worked out in terms of what you have to do get stability, a nice
transient response, the right time constants, what loop gain you need
(very critical as it turns out), etc. Anyway, who can resist Laplace
transforms, Bode plots, z-transforms and that stuff.

question:

>Recently I did some AV measurements on a commercial HP58503 unit vs one
>of our H-Masers. Inside the 58503 is a (pretty good) HP10514 OCXO and an
>ONCORE and a microprocessor. What I found was that at 1000 & 10,000 sec
>it performed exactly like a TAC. At shorter times, it looked pretty much
>like my composite "Good Xtal" model. However, it looks to me like HP is
>"pushing" the xtal with GPS too hard and that their D/A converter lacks
>the necessary resolution.

Are you suggesting HP doesn't know how to design a PLL? :-)
Seriously, I would be interested in how you arrived at that conclusion.

a final question:

The passage quoted above implies to me that TAC has some long term
filtering to make it comparable to the HP box.
Maybe I don't understand how TAC works. I thought it just took the
1 pps GPS rcvr ticks and offered them up to a PC. Where is the
long term filtering?

>Boy -- this is getting to be fun again! Sure glad you joined us, Brooks!
Fun for us maybe, but perhaps the rest of the guys are getting a little
bored!

73, Brooks

30. [TACGPS:722] Top 25 list

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Tue, 7 Oct 1997 12:41:32 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <343A736F.EB0@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

The top 25 responses to software/hardware problems:

25. Even though it does not work, how does it feel?
24. There must be a virus in the application software.
23. Somebody must have changed my code.
22. It works, but it's not been tested.
21. It's already there, but it has not been tested.
20. Didn't I fix it already?

19. THIS can't do THAT.
18. I can't test everything!
17. It's just some unlucky coincidence.
16. It will be done in no time at all.
15. Of course, I just have to do these small fixes.
14. I'm almost ready.
13. Oh, it's just a feature.
12. You must have the wrong executable.
11. Yes yes, it will be ready in time.
10. I have not touched that module!
9. There is something wrong in your test data.
8. The user has made an error again.
7. Has the operating system been updated?
6. The machine seems to be broken.
5. How is this possible?
4. Well, the program needs some fixing.
3. It did work yesterday.
2. I've never heard about that.
1. Strange...

31. [TACGPS:723] Re: Very long acquisition time for GPS-20 ?

From: chrise@n0jcf.com (Chris Elmquist)
Date: Tue, 7 Oct 1997 15:40:34 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <m0xIfMh-000UNrC@n0jcf.com>
Rendered body type: text/plain

Thanks to everyone who replied in response to my question about the
long acq. time for the GPS-20. It surely appears that something is
out of the ordinary with my setup. I'll re-check RF signal levels,
battery voltage and NMEA status reports and see if anything is obvious.

A coworker, who has a GPS-20 purchased in parallel with mine, is seeing
acq. times of less than 5 minutes from power off... so, there is hope !

Some folks asked if my receiver was moving when I experienced the
huge delay... and it wasn't. The antenna (an active patch from Lowe
Electronics) is up on the roof of the house, extended by ~35 feet of
RG-6, which connects to the GPS-20 sitting next to the Linux box in the
shack. As far as I know, the house was stationary during the entire
3 second interval over which the module was powered down :-)

So, I suspect something has gone bad on the RF side...

Thanks for the replies.

Chris
--
Chris Elmquist, N0JCF
chrise@n0jcf.com
n0jcf@amsat.org

32. [TACGPS:724] Re: Very long acquisition time for GPS-20 ?

From: Dave Martindale <davem@cs.ubc.ca>
Date: Tue, 7 Oct 1997 16:09:03 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199710072104.OAA01023@grolsch.cs.ubc.ca>
Rendered body type: text/plain

Some folks asked if my receiver was moving when I experienced the
        huge delay... and it wasn't. The antenna (an active patch from Lowe
        Electronics) is up on the roof of the house, extended by ~35 feet of
        RG-6, which connects to the GPS-20 sitting next to the Linux box in the
        shack. As far as I know, the house was stationary during the entire
        3 second interval over which the module was powered down :-)

I've used a Lowe antenna on my GPS-20 with 50 or 60 feet of RG-58 between
the antenna cable and the receiver (i.e. 65-75 feet total cable length).
It works fine, and S/N values as reported by the 20 are still good.
RG-6 is 75 ohm, I think, but I can't imagine the impedance mismatch
causing a significant problem.

        Dave

33. [TACGPS:725] Re: Very long acquisition time for GPS-20 ?

From: chrise@n0jcf.com (Chris Elmquist)
Date: Tue, 7 Oct 1997 16:50:26 -0500 (CDT)
To: tacgps@tapr.org

Message-ID: <m0xIhPK-000UNrC@n0jcf.com>
Rendered body type: text/plain

Dave Martindale wrote:
>
> I've used a Lowe antenna on my GPS-20 with 50 or 60 feet of RG-58 between
> the antenna cable and the receiver (i.e. 65-75 feet total cable length).
> It works fine, and S/N values as reported by the 20 are still good.
> RG-6 is 75 ohm, I think, but I can't imagine the impedance mismatch
> causing a significant problem.

yes... when I first installed the antenna (and the RG-6), I was getting
great signal levels. I used the 'sigplot' program that is included
in the APRS distribution from WB4APR and let it run for a couple
days... there were really no nulls in the pattern and good sigs
right out to the horizon. So.. it *used* to work OK. And of course,
it's been powered up ever since... that's about 9 months of uptime.

yes, RG-6 is 75 ohm but I too didn't see a problem there since it was
being driven by the active patch and it really wasn't a huge extension
anyway. The large'ish SNRs measured after installation seemed to
confirm that the RG-6 was going to work OK anyway.

Perhaps my Lowe patch has taken ill...

I'll report back with whatever I discover.

Thanks.

Chris

--
Chris Elmquist, N0JCF
chrise@n0jcf.com
n0jcf@amsat.org

34. [TACGPS:726] GPS30PC Update

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Tue, 7 Oct 1997 19:50:34 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <v03110702b060856c3cf5@[208.134.134.40]>
Rendered body type: text/plain

The GPS30PCs arrived Friday at the office. Dorothy is trying to ship them
all out before she leaves for the DCC.

I think there is a good chance that almost all of them will get shipped,
but there could be a few that end up having to wait till her return.

See everyone in Baltimore in a few days!

Cheers - Greg

Greg Jones, WD5IVD
Austin, Texas
wd5ivd@tapr.org
http://www.tapr.org/~wd5ivd

35. [TACGPS:727] RE: TAC32/GPS-20

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Tue, 7 Oct 1997 21:18:18 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCD36E.67C72920.rick@cnssys.com>
Rendered body type: text/plain

Charlie,

There's not enough information in your message for me to diagnose the
problem so I will try some random thoughts. I'm putting this out to the
whole mailing list in case anyone has any ideas or is experiencing similar
problems. I want to get the big bugs like this out during ALPHA testing. I
appreciate bug reports. It is the quickest way for me to get things right.

The GPS-20 I have here is working fine. The hardest thing about TAC32 is
getting the initialization working reliably. The 1pps heartbeat light
indicates that things are almost working (good 1PPS to DCD, correct COM
port). The occasional S/N data suggests that the baud rate is correct.
Currently I only allow for 4800 baud on the GPS-20 (its default). If you

are using Showtime it is unlikely that you have changed the GPS-20's baud rate.

The time being displayed, but not updated, is the default behavior for TAC32. It first shows current PC time then waits for a time update message from the GPS receiver before doing anything more.

To force a re-initialization, bring up the Edit/Set Serial Port dialog box, set receiver to Garmin and select the correct COM port then click on OK. This will force TAC32 to reinitialize everything and it will only look for a Garmin receiver. This will cause the setup commands to be sent to the Garmin again. The Garmin, of course, must be wired to accept incoming commands. This is the way TAC-2 hardware is set up but the Garmin installation instructions do not show the necessary wires.

Also, the GPS-20 will not provide the necessary data to TAC32 until it is locked on to the satellites. I had to leave the one I have running overnight before it worked correctly. It was a factory fresh unit and was starting from scratch.

Look at the raw data by opening View/View Raw Data. Tell me if you see any error messages. What, if any GPS-20 messages do you see? After TAC32 has initialized the GPS-20 it should be producing only $GPGGA, $GPGSA, $GPGSV, and $GPRMC messages. [Note: the Motorola is different.]

If all else fails, shut down TAC32 and bring up a terminal program (ProComm, HyperTerm, or whatever). Set the terminal program to direct connect (no modem commands), 4800 baud, etc. Then look at the data coming from the Garmin. If you can generate a log, save more that a minute's worth (one message comes only once a minute) and send it to me for analysis. If no log, tell me what message types you see.

Are you coming to the DCC conference this weekend? Bring your receiver and perhaps I can discover something interesting.

Rick
WB2TNL

-----Original Message-----
From: Charles E. Heisler K3VDB [SMTP:cheisler@cyberia.com]
Sent: Tuesday, October 07, 1997 8:52 PM
To: rick@cnssys.com
Subject: TAC32/GPS-20

Hi Rick:.....Have not seen any other reports on the SIG regarding the new GPS32 ver1.0.10. I can still not get it to work with the Garmin GPS-20. (I hope it's not something stupid on my part) I should say I have had the GPS-20 and SHOWTIME working for over a year. In TAC32 I do see and here the red 1PPM block flash and 'sometimes' I get the Satellite's S/N displayed. I also can change com ports and select receivers. The big time is displayed but not updated. And all other windows are blank.

I do however appreciate your time and work on this project.

Thanks, Charlie

36. [TACGPS:728] Re: GPS disciplined OCXO

From: Lyle Johnson <lylej@azstarnet.com>
Date: Tue, 7 Oct 1997 21:41:41 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19971007192841.00722db4@pop.azstarnet.com>
Rendered body type: text/plain

>We made a first cut and decided that nearly all the logic could be fit into
>a common, cheap FPGA, with only the microprocessor and the analog signal
>conditioning parts not in the FPGA [Lyle -- I did some re-defining on what
>needs to go into the FPGA -- we need to talk soon!].

Unfortunately I won;t be at either of the events the next two weekends...sigh.

>(Lyle -- you had a lead on a fairly good xtal -- but
>I haven't heard any comments from you on it. Any news?).

I got two samples of a 10.0 MHz VCXO from Monitor Products delivered to me late last week. I'll dig up the specs and post them to you.

73,

Lyle

37. [TACGPS:729] TAC32 Version 1.0.11 available

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Tue, 7 Oct 1997 22:27:30 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCD378.84824F40.rick@cnssys.com>
Rendered body type: text/plain

TAC32 Version 1.0.11 is now available at http://www.cnssys.com/tac32. The FTP variants are up to date also.

This version fixed an important bug which effects the decoding of NMEA messages when some of the fields are null. This happens very often. You can see this when looking at the raw data display. Messages which should decode OK don't - they are preceded by "?" [This is normal for the GPGSA message as I'm not decoding it yet].

Effects "Garmin" and "Mot NMEA" modes, not "Mot Bin".

Rick
WB2TNL

38. [TACGPS:730] TAC32 with old 6-channel PVT-6's

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Tue, 7 Oct 1997 22:53:58 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <343AF572.5F7F@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Rick -- when we got together for beer the other nite, you chided me for not reporting on whether your latest fixes work with the older Motorola PVT-6s (the original name for what the later called the ONCORE BASIC). I cranked up a one a few minutes ago -- it has Version 6.0 firmware dated 20 Apr 94 and is one of the original TACs we sent out from NASA. After about 10 minutes the receiver came to life (the BBRAM battery had run down). Here is what I find:

(1) You do correctly read the 6-channel @@Ba message just fine so the binary mode looks OK at first glance.

(2) In NMEA mode, the WGS-84 height is reported as identical to the MSL height. Remember that for these early rcvrs, Motorola (incorrectly) returned WGS-84 geoid heights in $GPGGA message (which is supposed to be the MSL height since NMEA is designed for marine applications). In this area, MSL altitude is 34M greater that the WGS-84 geoid height. The $GPGGA message is reporting -34M as the geoid correction. Somehow the algorithm I gave you from SHOWTIME didn't translate correctly in TAC32.

Tom

39. [TACGPS:731] Re: GPS disciplined OCXO

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Tue, 7 Oct 1997 23:05:12 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <343AF600.4102@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Lyle Johnson wrote:
>
> Unfortunately I won;t be at either of the events the next two weekends...sigh.

Sorry we won't see you -- but we still need to talk RSN!

> >(Lyle -- you had a lead on a fairly good xtal -- but
> >I haven't heard any comments from you on it. Any news?).
>
> I got two samples of a 10.0 MHz VCXO from Monitor Products delivered to me
> late last week. I'll dig up the specs and post them to you.

Keep us posted. What's the price & package?

Tom

40. [TACGPS:732] TOC -- Block Diagram

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Wed, 8 Oct 1997 00:01:59 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <343B05A4.D88@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Since Brooks & I have been innundating you with material on GPS+xtal
composite (a.k.a. disciplined) frequency standards, and since I will
be discussing the topic Saturday afternoon at the TAPR/ARRL DCC,
I thought some of you might like to see the block diagram of my
concept (which is one of the figures I prepared for the DCC).

It is on my aleph ftp file server at URL

  ftp://aleph.gsfc.nasa.gov/GPS/tapr_dcc/toc-blok.zip

Inside the zip file are two versions of my block diagram -- one in
PostScript (which looks fairly good when printed from GhostScript)
and one that should be directly printable on an HP Laserjet by
just typing   copy toc-blok.prn lpt1:

It's kinda painful to plot schematics into .gif or .jpg files and
they lose something in translation, so I won't make those formats
unless there is a demand.

Especially for Brooks benefit one part of the schematic needs a
little explanation. The TAC-2 produces, in addition to the wide
(0.2s for the ONCOREs) 1PPS output, a 5 usec wide pulse, negative
going at the second. The start/stop gate is a simple RS flip-flop
which is set by this pulse. I envision that the countdown chain
for the frequency standard will include a 10 kpps pulse train
offset 50 usec from the countdown's zero. The RS latch
can never produce a pulse narrower than the 5 usec GPS pulse, so
it would have a range of 5 to 105 usec and a nominal value of
50 usec for the PLL to servo to.

One idea I had for implementing the counter (which led me to
this scheme) was to use a Basic Stamp 2 as the embedded processor.
It has a pulse width measuring capability built into its firmware;
unfortunately it is a bit coarse, having a resolution of only 2
usec. As you can tell from the discussions Brooks & I have been
having the past couple of days, the ability to control/understand
the statistical properties of the time-interval measurement process
is critical to achieving really high performance. Hence I'm having
serious second thoughts that the Stamp is not the right processor
to use.

I hope that the cross-hatching on the plots print OK for you since
I used this as a way to show my current boundaries of the FPGA ASIC.
They look ok on my Laserjet.

Lyle -- you'll note that I now think that the FPGA should include a
ripple counter to measure the pulse width. Not shown on the block
diagram is the parallel-to-serial shift register to read out this
counter. Since the FPGA you suggested was already pretty full, we
will probably need the next larger size. Do you see any problems?

73, Tom

41. [TACGPS:733] RE: TAC32 with old 6-channel PVT-6's

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Wed, 8 Oct 1997 00:15:48 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCD387.0C386740.rick@cnssys.com>
Rendered body type: text/plain

Tom,

Could you bring that unit to DCC so I can debug the problem there? I may not be picking up the version
number correctly.

I may not make Friday. Supposed to go to PAX NAWC (Navy) Thursday or Friday. If it's Friday I won't
make DCC until Saturday morning.

Rick

-----Original Message-----
From: Tom Clark (W3IWI) [SMTP:clark@tomcat.gsfc.nasa.gov]
Sent: Tuesday, October 07, 1997 11:54 PM

To: tacgps@tapr.org
Subject: [TACGPS:730] TAC32 with old 6-channel PVT-6's

Rick -- when we got together for beer the other nite, you chided me
for not reporting on whether your latest fixes work with the older
Motorola PVT-6s (the original name for what the later called the
ONCORE BASIC). I cranked up a one a few minutes ago -- it has
Version 6.0 firmware dated 20 Apr 94 and is one of the original
TACs we sent out from NASA. After about 10 minutes the receiver
came to life (the BBRAM battery had run down). Here is what I find:

(1) You do correctly read the 6-channel @@Ba message just fine so
the binary mode looks OK at first glance.

(2) In NMEA mode, the WGS-84 height is reported as identical to
the MSL height. Remember that for these early rcvrs, Motorola
(incorrectly) returned WGS-84 geoid heights in $GPGGA message
(which is supposed to be the MSL height since NMEA is designed
for marine applications). In this area, MSL altitude is 34M
greater that the WGS-84 geoid height. The $GPGGA message is
reporting -34M as the geoid correction. Somehow the algorithm
I gave you from SHOWTIME didn't translate correctly in TAC32.

Tom

42. [TACGPS:734] VCXO

From: Lyle Johnson <lylej@azstarnet.com>
Date: Wed, 8 Oct 1997 20:26:26 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19971008180431.00726058@pop.azstarnet.com>
Rendered body type: text/plain

Tom,

Here is what I have on the VCXO so far:

Mfr: Monitor Products
Model: 6701 series
Price: No price yet.
Size: .815" x .450" x .285" (like standard 4-pin clock oscillator
Frequency tolerance: +/- 25 ppm
Control deviation: +/- 100 ppm
control voltage: 0-5 VDC
Supply voltage: 5 VDC
power: 0.15 watts
output: HCMOS levels

73,

Lyle

43. [TACGPS:735] TAC32 Version 1.0.12 available

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Wed, 8 Oct 1997 22:53:04 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCD445.0994A620.rick@cnssys.com>
Rendered body type: text/plain

TAC32 Version 1.0.12 is now available at http://www.cnssys.com/tac32. The
FTP variants are up to date also.

This version fixes the problem described in Tom's message, below. The
problem was a typo in a line of code which actually compiled correctly but
at execution time that line of code did nothing! Would you please try this
again, Tom. I do not have an old Motorola receiver here.

Rick
WB2TNL

-----Original Message-----
From: Tom Clark (W3IWI) [SMTP:clark@tomcat.gsfc.nasa.gov]
Sent: Tuesday, October 07, 1997 11:54 PM
To: tacgps@tapr.org
Subject: [TACGPS:730] TAC32 with old 6-channel PVT-6's

Rick -- when we got together for beer the other nite, you chided me
for not reporting on whether your latest fixes work with the older
Motorola PVT-6s (the original name for what the later called the

ONCORE BASIC). I cranked up a one a few minutes ago -- it has
Version 6.0 firmware dated 20 Apr 94 and is one of the original
TACs we sent out from NASA. After about 10 minutes the receiver
came to life (the BBRAM battery had run down). Here is what I find:

(1) You do correctly read the 6-channel @@Ba message just fine so
the binary mode looks OK at first glance.

(2) In NMEA mode, the WGS-84 height is reported as identical to
the MSL height. Remember that for these early rcvrs, Motorola
(incorrectly) returned WGS-84 geoid heights in $GPGGA message
(which is supposed to be the MSL height since NMEA is designed
for marine applications). In this area, MSL altitude is 34M
greater that the WGS-84 geoid height. The $GPGGA message is
reporting -34M as the geoid correction. Somehow the algorithm
I gave you from SHOWTIME didn't translate correctly in TAC32.

Tom

44. [TACGPS:736] RE: TAC32 with old 6-channel PVT-6's

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Wed, 8 Oct 1997 23:05:07 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <343C4753.FB6@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Richard M. Hambly wrote:
>
> Tom,
>
> Could you bring that unit to DCC so I can debug the problem there?
> I may not be picking up the version number correctly.
>
> I may not make Friday. Supposed to go to PAX NAWC (Navy) Thursday
> or Friday. If it's Friday I won't make DCC until Saturday morning.
>
> Rick

Yeah -- I'll have it there, along with my "travels everywhere" TAC-2
8-channel unit. I also have scrounged a suitable antique laptop so
that I can have SHOWTIME running in tandem with TAC32 (the new
machine to replace the one that was stolen has STILL not arrived
from Gateway).

Looks like 1.0.11 fixed another problem I spotted last nite -- there
were times that the satellite window was not displaying in NMEA
mode. I think your new NMEA parser that doesn't barf on null fields
solved that problem. I had to fight the same battle in SHOWTIME.

Tom

45. [TACGPS:737] RE: TAC32 with old 6-channel PVT-6's

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Wed, 8 Oct 1997 23:56:53 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCD44E.236524E0.rick@cnssys.com>
Rendered body type: text/plain

Check out 1.1.12.

I will bring two TAC units nicely packaged. I finished the second one this
evening. I will also bring my Laptop and a 17" monitor. Should I bring my
GPS 4-way antenna splitter/amp (WR, Inc.). Should I bring a power supply?

I will also be equipped to do some on-site debugging. Charlie, K3VDB, is
coming in from York PA with a Garmin GPS-20 which works on Showtime but not
on TAC32 1.10. Don't know if he has tried 1.11 or 1.12.

I'm going to be at PAX NAWC (southern MD) tomorrow - leaving around 10:30
am. You can reach me at 410-591-6065 (cell phone) any time if I'm not
here. If we have trouble during the integration tests it might spill over
into Friday. In that case I will be late getting to DCC on Friday. Is
there a demo area? Will we have to baby-sit the equipment or is there some
kind of security?

Also - since I packaged the two receivers I noticed a significant rise in
internal temperature. The Garmin reports temperature in its ID message
which I display (View/View Receiver ID message). Unlike the one-time read
of the Motorola ID message, I get the Garmin data once a minute which

allows me to track the temperature. Box open = 40C, box closed = 52C. The Motorola box probably gets even hotter but I haven't had time to stick a temperature probe in there. One thing I'm sure of - I will not use linear regulators in the future! For now I dropped the supply voltage to 8V which drops the temp to 47C.

Rick

-----Original Message-----
From: Tom Clark (W3IWI) [SMTP:clark@tomcat.gsfc.nasa.gov]
Sent: Thursday, October 09, 1997 12:05 AM
To: tacgps@tapr.org
Subject: [TACGPS:736] RE: TAC32 with old 6-channel PVT-6's

Richard M. Hambly wrote:
>
> Tom,
>
> Could you bring that unit to DCC so I can debug the problem there?
> I may not be picking up the version number correctly.
>
> I may not make Friday. Supposed to go to PAX NAWC (Navy) Thursday
> or Friday. If it's Friday I won't make DCC until Saturday morning.
>
> Rick

Yeah -- I'll have it there, along with my "travels everywhere" TAC-2 8-channel unit. I also have scrounged a suitable antique laptop so that I can have SHOWTIME running in tandem with TAC32 (the new machine to replace the one that was stolen has STILL not arrived from Gateway).

Looks like 1.0.11 fixed another problem I spotted last nite -- there were times that the satellite window was not displaying in NMEA mode. I think your new NMEA parser that doesn't barf on null fields solved that problem. I had to fight the same battle in SHOWTIME.

Tom

46. [TACGPS:738] Re: TOC -- Block Diagram

From: Tom Van Baak <tvb@veritas.com>
Date: Thu, 9 Oct 1997 10:02:40 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <343CEEEC.28A9@veritas.com>
Rendered body type: text/plain

Tom Clark (W3IWI) wrote:
>
> Since Brooks & I have been inundating you with material on GPS+xtal
> composite (a.k.a. disciplined) frequency standards, and since I will
> be discussing the topic Saturday afternoon at the TAPR/ARRL DCC,
> I thought some of you might like to see the block diagram of my
> concept (which is one of the figures I prepared for the DCC).
>
> It is on my aleph ftp file server at URL
>
>   ftp://aleph.gsfc.nasa.gov/GPS/tapr_dcc/toc-blok.zip

Thanks, Tom, for the TOC diagram. Here's an alternative design which I call a "snap counter".

The 10 MHz oscillator output is conditioned and used to drive a divider chain, the first two decades of which are synchronous counters (AC160). The 8 Q outputs of these two counters go to an edge-triggered 8-bit latch (AC374). Note the divider chain is not gated and counts continuously.

Each second the leading edge of the 1 PPS output from the TAC is synchronized with the leading edge of the 10 MHz clock (two or three gates) and used to trigger the latch. Note the setup/hold time of the AC374 is a few ns.

The latch thus holds the instantaneous low-order digits of the divider chain count at the epoch (a "snap-shot"). These digits represent 1.0 and 0.1 us. The 8-bit latch is then serially read out by the uP using an LS165.

The advantages of this approach over the RS gate scheme
in your diagram are:

- The same divider chain is used for both low-frequency
  buffered outputs and for measuring the delta between
  GPS and the steered oscillator.

- It has 100 ns time-interval measurement resolution
  instead of 1 or more us.

- The uP is no longer in the critical path for each
  measurement; it has a whole second to read out and
  process the data. The resolution is fixed at 100 ns
  and independent of the speed of the uP. Unless there
  is a lot of math (speed), or a lot of history to be
  stored (memory), a BS II or a PIC will still work.

- The "continuous count" scheme eliminates long-term
  accumulation of error due to +/- 1 count jitter of
  each time-interval or pulse width measurement.

- Continuous count also means the uP could sample the
  latch at arbitrary rates (e.g., once a second, or
  once a minute, or once every 1000 seconds) and still
  not lose any long-term steering information.

- An 1 Hz sampled 10 MHz 8-bit snap counter can safely
  handle oscillator stability as bad as 1e-6. It can
  also detect frequency errors of 1e-10 within 1000 s
  and 1e-12 in a day.

Let me know if you want me to elaborate.

Thanks,
/tvb

47. [TACGPS:739] RE: TAC32 with old 6-channel PVT-6's

From: "Charles E. Heisler K3VDB" <cheisler@cyberia.com>
Date: Thu, 9 Oct 1997 13:57:34 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19971009145612.0069a894@cyberia.com>
Rendered body type: text/plain

At 11:56 PM 10/8/97 -0500, you wrote:
>Check out 1.1.12.
----------Snip----------

Hi Rick:.....Still no joy here with ver1.1.12. I will bring my
GPS-20, P/S, antenna and serial cable. C U tomorrow.

-73- Charlie K3VDB

48. [TACGPS:740] Re: TOC -- Block Diagram

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Thu, 9 Oct 1997 15:16:48 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <343D3B65.16D@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Tom Van Baak wrote:

> Thanks, Tom, for the TOC diagram. Here's an alternative
> design which I call a "snap counter".
>
> The 10 MHz oscillator output is conditioned and used
> to drive a divider chain, the first two decades of
> which are synchronous counters (AC160). The 8 Q outputs
> of these two counters go to an edge-triggered 8-bit
> latch (AC374). Note the divider chain is not gated and
> counts continuously.
>
> Each second the leading edge of the 1 PPS output from
> the TAC is synchronized with the leading edge of the
> 10 MHz clock (two or three gates) and used to trigger
> the latch. Note the setup/hold time of the AC374 is a
> few ns.
>
> The latch thus holds the instantaneous low-order digits
> of the divider chain count at the epoch (a "snap-shot").

> These digits represent 1.0 and 0.1 us. The 8-bit latch
> is then serially read out by the uP using an LS165.

I did consider a design something like this and have not
discarded it. I would have grabbed at least one more digit
to avoid possible cycle ambiguities, especially initially
when an oscillator is "warming up"

> The advantages of this approach over the RS gate scheme
> in your diagram are:
>
> - The same divider chain is used for both low-frequency
>   buffered outputs and for measuring the delta between
>   GPS and the steered oscillator.

In my scheme, we are already using major parts of the count-down
chain (from 1 MHz down to 1 sec) as the pulse generator for the
BCD rate multiplier, which in turn is the key element in the
1:10e6 D/A converter.

> - It has 100 ns time-interval measurement resolution
>   instead of 1 or more us.

I envisioned the time-base counter running at 20 MHz clock (simple
doubler from the 10 MHz xtal) since I want to have at least 50 nsec
resolution in the timing. The ONCORE rcvr has an inherent 104 nsec
sawtooth dither (arising from their use of a 9.54 MHz reference to
derive the 1PPS signal) with ~6 second periodicity (as an example,see
ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/tac-1sec.gif)

> - The uP is no longer in the critical path for each
>   measurement; it has a whole second to read out and
>   process the data. The resolution is fixed at 100 ns
>   and independent of the speed of the uP. Unless there
>   is a lot of math (speed), or a lot of history to be
>   stored (memory), a BS II or a PIC will still work.

Because of the statistical properties of SA, and because of the
inherent 104 nsec sawtooth in the ONCORE, it is highly desirable
to measure the average value of a number of discrete 1 second
time-intervals, not just the elapsed change after the same time
interval has elapsed. This averaging can either be done in hardware
(summing a number of discrete measurements) or in software by
having the uP gulp in all the measurements and doing the averaging.
But the numbers only arrive at a 1 measurement/second rate, so
the arithmetic is not to daunting. My experience has indicated
that we should probably use a 30 to 100 second time-interval average
as the "normal points" to then feed to the loop averager (which was
the topic Brooks & I were discussing).

> - The "continuous count" scheme eliminates long-term
>   accumulation of error due to +/- 1 count jitter of
>   each time-interval or pulse width measurement.

Those tend not to be a problem. The 104 nsec predictable sawtooth
"jitter" actually help resolve this if you do time-interval averaging.
And it avoids the "locked digit" syndrome seen in many precise
time interval determinations. In fact, Hewlett-Packard and other
counter manufacturers have intentionally added some dithering noise
for just this reason.

> - Continuous count also means the uP could sample the
>   latch at arbitrary rates (e.g., once a second, or
>   once a minute, or once every 1000 seconds) and still
>   not lose any long-term steering information.
>
> - An 1 Hz sampled 10 MHz 8-bit snap counter can safely
>   handle oscillator stability as bad as 1e-6. It can
>   also detect frequency errors of 1e-10 within 1000 s
>   and 1e-12 in a day.

And then Wis Macomson added:

> Assuming you're using a (D type) flip-flop to sample the 1 PPS,
> how does the inherent +/- 1 clock uncertainty in this synchronizer
> affect stability? At 10MHz, is this significant?
>
> Also, if you're using two or more flip-flops in series to reduce
> exposure to metastability, can you deal properly with the extra

> delay (offset) introduced by the additional stages?

I think I suggested the answer above -- the intrinsic dither makes
the discrete sampling a non-problem. And extra flip-flops just add
an irrelevant constant to the measurement.

73, Tom

49. [TACGPS:741] TAC32 1.0.12 Problems

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Fri, 10 Oct 1997 00:13:37 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <343DAB30.3336@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Rick -- a couple more for your list

(1) with the latest bits you posted, the Geoid height correction
is being applied for the old (firmware 6.0) 6-channel PVT-6, but
the sign is wrong.

(2) In toggling between NMEA and BIN the software crashed. The
debugger in MS Developer Studio sez that it got "Unhandled Exception
in MFC42.DLL:0xC00000005: Access Violation"

See you tomorrow. I did get SHOWTIME running fine on the old Compaq
386-20 laptop -- even under DesqView and even with a graphical
Rolex watch program running in another DV window. Too bad the display
is a grubby monochrome LCD!

FYI -- the W3IWI-13 DGPS beacon is alive again on 145.79, with
a beacon rate of once/15 seconds. Probably adequate if not many
packets are lost, but 145.79 sounded like a DX pileup with so
many people in town for the DCC.

73, Tom

50. [TACGPS:742] TAC32 1.0.12 and CTL3D32.DLL

From: bsmeds@esoc.esa.de
Date: Fri, 10 Oct 1997 03:01:29 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <C125652C.00268A79.00@esocmail1.esoc.esa.de>
Rendered body type: text/plain

Shortly after installing TAC32 1.0.12 on a Windows 95 PC I get an error
message when starting Lotus Notes.

The error message : This application uses CTL3D32.DLL which is not the
correct version. This version of CTL3D32.DLL
is designed only for Windows NT systems.

It looks like the installation of TAC32 1.0.12 replaced my CTL3D32.DLL
from version 2.29.000 to 2.31.000
I did not see any other effects. After changing back to version 2.29.000
the error message disappeared.
Did anyone else notice that the file CTL3D32.dll changed after installing
TAC32 1.0.12?
I am not an expert on Win 95 but I thought it could be of interest to the
group.

Boris DJ0EX SM0GJ

51. [TACGPS:743] NMEA clock driver

From: Henk Uijterwaal <henk@ripe.net>
Date: Fri, 10 Oct 1997 04:54:18 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <343DF9C0.15FB7483@ripe.net>
Rendered body type: text/plain

I'm trying to set up NTP with a NMEA reference clock. This clock is
connected to the com2 port of a PC running FreeBSD.

I started by patching refclock_open so that it sets up the com port
correctly (baud rates, com-port options, etc). This is code
transplanted
from a little test program that I wrote. With a second test-program
that just listens to the port, I can see that the clock is sending the
right strings. However, when I add the clock to /etc/ntp.conf with

```
  server 127.127.20.1     prefer

NTP never seems to recognize this clock as xtnpdc returns:

  xntpdc> peers
       remote           local      st poll reach  delay   offset
disp

==============================================================================
  =GPS_NMEA(1)     5.0.0.0          0   64    0 0.00000  0.000000
16.0000

and I never get any messages about synchronization achieved.

I then looked at the code of refclock_nmea.c .  There is a routine
nmea_receive in there.  In this routine there is a statement:

  pp->lencode = refclock_gtlin(rbufp, pp->lastcode, BMAX, &trtmp);

Further down in the code, pp->lastcode is parsed.  However, when I
log this string, it seems to be chopped up into 6 character pieces:

        10 Oct 11:40:58 xntpd[13202]: GPRMC
        10 Oct 11:40:58 xntpd[13202]: ,0940
        10 Oct 11:40:58 xntpd[13202]: 58.00
        10 Oct 11:40:58 xntpd[13202]: ,A,5

and thus the code further down doesn't recognize the strings as valid
NMEA input.

I looked into the source of refclock_getln but couldn't find anything
obvious there that could cause this problem.



So, does anybody on this list have any idea what is wrong here and
how to solve it?

Henk

-------------------------------------------------------------------------------
Henk Uijterwaal                    Email: henk.uijterwaal@ripe.net
RIPE Network Coordination Centre     WWW: http://www.ripe.net/home/henk
Singel 258                         Phone: +31.20.5354414
1016 AB Amsterdam                    Fax: +31.20.5354445
The Netherlands                     Home: +31.20.6651962
-------------------------------------------------------------------------------

%DCL-E-NOCFFE, unable to locate coffee - keyboard input suspended.
```

52. [TACGPS:744] Re: TAC32 1.0.12 and CTL3D32.DLL

```
From: John Koster <w9ddd@tapr.org>
Date: Fri, 10 Oct 1997 07:37:07 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <Pine.BSI.3.91.971010072319.15043A-100000@tapr.org>
Rendered body type: text/plain
```

This was a frequent problem even with Windows 3.x. Install a new
application and it installs a newer version of a DLL, which then breaks
another application which uses the same DLL.

Anyone ever come up with a good solution? The only one I ever came up
with, was to store all the known working DLLs off in a hidden directory.
Then when something breaks, you restore the old ones. This at least gets
you back to where you where. Not very elegant, but it works. The way
some of the newer install programs search everywhere on your hard drive, I'm
not sure this always works in W95. It did through one battle I had
getting a TCP-IP/Netware interface to work.

(A WIN95 install found that I had copies of WIN3.1 on both C: and D: and
fiddled with both of them)

Anyone have a better idea? (yes, this is getting a little off topic, so
email to me if you prefer)

John w9ddd@tapr.org

On Fri, 10 Oct 1997 bsmeds@esoc.esa.de wrote:

> Shortly after installing TAC32 1.0.12 on a Windows 95 PC I get an error
> message when starting Lotus Notes.
>
> The error message : This application uses CTL3D32.DLL which is not the
> correct version. This version of CTL3D32.DLL
> is designed only for Windows NT systems.
>
> It looks like the installation of TAC32 1.0.12 replaced my CTL3D32.DLL
> from version 2.29.000 to 2.31.000
> I did not see any other effects. After changing back to version 2.29.000
> the error message disappeared.
> Did anyone else notice that the file CTL3D32.dll changed after installing
> TAC32 1.0.12?
> I am not an expert on Win 95 but I thought it could be of interest to the
> group.
>
> Boris DJ0EX SM0GJ

53. [TACGPS:745] Results on TAC-2 measurements

From: "James L. Johnson" <jjjohnson@saiph.hpl.hp.com>
Date: Fri, 10 Oct 1997 12:24:33 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199710101724.KAA17221@saiph.hpl.hp.com>
Rendered body type: text/plain

My colleague and I have been running my new TAC-2 for about a week
and have some results to report and a comment or two.

   Rather than using ADEV (Allan deviation) to characterize the clock,
we use TDEV (root time variance) as its intended use is as a time
standard, not a frequency standard. TDEV shows the signatures due to
the quantization error in the PVT-6 (104 ns divided by sqrt(12) =
30 ns) and due to SA (correlation time ~300-400 seconds) quite nicely.
The minimum TDEV point is at about 30 seconds averaging time, where
the value is 4E-9. Below that and it increases due to quantization
error and above 30s it starts to climb due to SA. For those folks
who are interested in ADEV, we ran a plot of it for fun. Here is
some tabulated data, with the number of pairs used in each two-sample
(Allan) deviation measurement. The reference against which we made
the measurement is an ensembled pair of HP5071A Option 001 (hi-perf)
standards, comparing 1PPS outputs with an HP E1420B time-interval
counter.

Avg time	ADEV	# of pairs
1 sec.	5.65E-8	32765
10	5.0E-9	>3000
100	6.0E-10	>250
1000	6.0E-11	~30 (error bars are quite big with only 30 pairs)

   I think we got lucky with our cable delay measurements (physical
length) as our time synchronization is "spot on" to our reference
clock, which we think is within about 25 ns of UTC(USNO), by using
Advanced Common-View time transfer methods.

   I had SHOWTIME running for about a week and then for some reason
it died (stopped running). Win95 didn't stop so I don't really
know what happened. I restarted SHOWTIME and everything popped up
immediately, as though nothing had happened. Has this happened to
anybody else or is it just me?

   Tom, I wanted to comment on the HP58503 to which you made
reference a few times. Your observations made me so curious about

it that I am borrowing one (new off the production line) to test
for myself. It will arrive next week. What I do know about the
product is that its internal oscillator is an HP10811. You might
have been thinking of the HP10544 when you mentioned HP10514. I
don't believe the 10544 has been shipped in a new product since
about 1980. The 10811 was introduced in 1979 as the replacement
for the 10544. The 10811 uses the HP SC-cut crystal.

   The DAC in the 58503 is a 16-bit DAC dithered to 20 bits. I'll
see if I can get ADEV measurements out to 10 seconds and some TDEV
data for the long term.

   Hope everyone is having a great time at the conference (this
weekend) and I'm looking forward to hearing all about it.

   Regards,

   Jim W6SC
   Work: jjohnson@hpl.hp.com
   Home: jjoker@dxhound.com

54. [TACGPS:746] Re: Results on TAC-2 measurements

From: Tom Van Baak <tvb@veritas.com>
Date: Fri, 10 Oct 1997 14:33:21 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <343E8062.2D4A@veritas.com>
Rendered body type: text/plain

James L. Johnson wrote:
[snip]
>   Tom, I wanted to comment on the HP58503 to which you made
> reference a few times. Your observations made me so curious about
> it that I am borrowing one (new off the production line) to test
> for myself. It will arrive next week. What I do know about the
> product is that its internal oscillator is an HP10811. You might
> have been thinking of the HP10544 when you mentioned HP10514. I
> don't believe the 10544 has been shipped in a new product since
> about 1980. The 10811 was introduced in 1979 as the replacement
> for the 10544. The 10811 uses the HP SC-cut crystal.
>
>   The DAC in the 58503 is a 16-bit DAC dithered to 20 bits. I'll
> see if I can get ADEV measurements out to 10 seconds and some TDEV
> data for the long term.
>
>   Hope everyone is having a great time at the conference (this
> weekend) and I'm looking forward to hearing all about it.
>
>   Regards,
>
>   Jim W6SC
>   Work: jjohnson@hpl.hp.com
>   Home: jjoker@dxhound.com

For another data point, the OCXO in the HP 58503A I've been
using is a 10811-60159. In a conversation with HP last year
I was told this variation of the standard 10811D OCXO has
an extended EFC range specification. It enables the 58503
to continue to be software disciplined, without maintenance,
in spite of years of oscillator ageing and without requiring
the user to ever turn a coarse adjustment screw. I have specs
on the 10811 OCXO family but not the special -60159 model
so I can't confirm this report but it sounds plausible.

I also recall them saying that the HP 58503A tracks ambient
temperature and factors that into the control voltage, at
least during hold-over.

It would be nice, Jim, if you could confirm or elaborate on
any of this.

Based on my tests, I have to agree with Tom Clark's earlier
comment about the short-term (1 to 1000 s) stability of
the HP 58503A. I found it surprisingly poor compared to a
stand-alone 10811D or other high-end OCXO.

I once remarked to HP that the 58503A must have at least a
24-bit DAC and extremely low tempco voltage references in
order to work unattended for years. The answer I got was:
no, because of the software PLL it wasn't necessary to have

extremely precise DACs or voltage references: the control
voltage is adjusted as necessary regardless whether the
phase error is the result of oscillator ageing, poor DAC
or EFC resolution, or ambient temperature effects on the
analog ICs or the OCXO. Interesting.

I have a number of 10811 or equivalent OCXO's and after
running for months or years many of them have ageing rates
one or two orders of magnitude below their 5e-10 spec. But
a typical tempco for these is 2.5e-9 for 0 to 50 C which
(assuming linear) is 5e-11/C. Since I often see a 10 C
temperature change in my lab (garage), this net 5e-10 daily
temperature-induced error *totally* dominates the medium
term (1000 to 100000 s) stability of these references.

/tvb

55. [TACGPS:747] Re: TOC -- Block Diagram

From: Brooks Shera <ebs@lanl.gov>
Date: Fri, 10 Oct 1997 15:36:23 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199710102032.OAA23926@newreg.lanl.gov>
Rendered body type: text/plain

Tom et al.:

A comment or two based on my recent experiences:

>I did consider a design something like this and have not
>discarded it. I would have grabbed at least one more digit
>to avoid possible cycle ambiguities, especially initially
>when an oscillator is "warming up"

It is important, as Tom suggests, to use a phase detector
that has a reasonable lock-in range. I use a divide-by-16
between a 5 MHz VCO and gated-counter style phase detector.
This allows the phase to vary +/- 1.5 usec before "cycle-slip"
occurs. This is plenty once the PLL locks but it slows
down the lock-in process if there is a significant freq.
error at start up. A divide-by-64 might be better.
Rather than change the hardware I choose to correct cycle
slip in the software.

Interestingly, lock-in still occurs in the presence of cycle
slipping, apparently because the VCO gets the proper polarity
correction just a little more than 1/2 the time.
Nature is kind for once.

>Those tend not to be a problem. The 104 nsec predictable sawtooth
>"jitter" actually help resolve this if you do time-interval averaging.
>And it avoids the "locked digit" syndrome seen in many precise
>time interval determinations. In fact, Hewlett-Packard and other
>counter manufacturers have intentionally added some dithering noise
>for just this reason.

When I first started building my circuit I spent quite a bit of time
trying to figure out a good economical way to make an "certifiably"
accurate high resolution phase detector. Most of these schemes
involved generating a "pseudo-random" pulse sequence with a tapped
feedback shift register (to feed the gated counter). The pulse sequence,
which has a known average value, doesn't have to have a high
frequency, since averaging gives high resolution. After writing a
bunch of simulation programs and trying different things, I concluded
it wasn't worth the circuitry involved.

Instead I settled on a separate oscillator NOT related in freq. or
phase to the VCO or the GPS ticks. I use a cheap xtal oscillator
(at about 25 MHz). It drifts around a bit and does a nice averaging
job. I have tested my phase detector and it shows a good linear
behaviour with no sign of a sawtooth at the level of 1 or 2 nsec,
when I average together 60 measurements. (My R/S-flipflop gated
counter averages together 30 or 60 or more 1-sec phase measurements
depending on the needs of the IIR filter software that runs in the PIC.)

I think the moral is: DON'T use a phase measurement oscillator that
is derived from the VCO.

This brings up another point.

How do you prevent an oscillator from locking to another nearby
oscillator that is almost harmonically related?

I found that my VCO was readily captured and phase locked by
circuit noise from the GPS 1 pps ticks. The noise could get into
the VCO via the voltage control line or couple back into the VCO
rf output.

You may remember a "coupled pendulum" physics demonstration
in which two pendulums hang from a common support. If the natural
frequencies are close together the two pendulums will soon swing
in phase, even though the coupling is very, very small.

Unfortunately for the VCO, the phase locking is unstable, doesn't
benefit from my low pass filter, and in fact can produce phase
jumps that confuse the filter. It just gets in the way when
the goal is to generate a high accurate, phase stable frequency.

I was quite surprised when I first saw this effect, and it took
awhile to figure out what was happening. The coupling has to be
reduced to a very low level.

73, Brooks

56. [TACGPS:748] Re: TOC -- Block Diagram

From: Tom Van Baak <tvb@veritas.com>
Date: Fri, 10 Oct 1997 16:38:33 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <343E9EFE.53D2@veritas.com>
Rendered body type: text/plain

Dr Thomas A Clark (W3IWI) wrote:
[snip]
> I envisioned the time-base counter running at 20 MHz clock (simple
> doubler from the 10 MHz xtal) since I want to have at least 50 nsec
> resolution in the timing. The ONCORE rcvr has an inherent 104 nsec
> sawtooth dither (arising from their use of a 9.54 MHz reference to
> derive the 1PPS signal) with ~6 second periodicity (as an example,see
> ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/tac-1sec.gif)

Yes, I first thought the Oncore 104 ns sawtooth effect was
a real pain but it turns out this unintentional dithering
is very handy in the TOC case, isn't it.

> But the numbers only arrive at a 1 measurement/second rate, so
> the arithmetic is not to daunting. My experience has indicated
> that we should probably use a 30 to 100 second time-interval average
> as the "normal points" to then feed to the loop averager (which was
> the topic Brooks & I were discussing).

I would be careful about the ~6 second periodicity claim. It
certainly was about 6 seconds during the 8 minutes captured
for that particular plot you created. But it's not always 6
nor that consistent (or maybe it's just *my* Oncore!). The
sawtooth can have positive slope or negative slope or look
like a clothesline. Take a close look at longer runs: I've
seen periods from 1 or 2 to well over 100. This means one
has to be a little careful about using only a 30 to 100
second time interval average, no?

Following are period count histograms for three back-to-back
one hour runs. The third is similar to your GGAO plot but
the first two demonstrate how inconsistent the periodicity
can be.

"3 AM run"

Period Count	Instances	Percent	Cumulative
1	12	7.2	7.2
2	12	7.2	14.4
3	8	4.8	19.2
4	2	1.2	20.4
5	5	3.0	23.4
7	4	2.4	25.7
8	3	1.8	27.5
9	6	3.6	31.1
10	5	3.0	34.1
11	3	1.8	35.9

12	12	7.2	43.1
13	6	3.6	46.7
14	6	3.6	50.3
15	5	3.0	53.3
16	2	1.2	54.5
17	5	3.0	57.5
18	6	3.6	61.1
19	3	1.8	62.9
21	4	2.4	65.3
22	3	1.8	67.1
23	3	1.8	68.9
24	1	0.6	69.5
25	3	1.8	71.3
26	6	3.6	74.9
27	2	1.2	76.0
28	3	1.8	77.8
31	2	1.2	79.0
32	2	1.2	80.2
33	2	1.2	81.4
34	1	0.6	82.0
36	3	1.8	83.8
37	2	1.2	85.0
38	1	0.6	85.6
39	1	0.6	86.2
42	1	0.6	86.8
43	2	1.2	88.0
45	1	0.6	88.6
48	2	1.2	89.8
49	1	0.6	90.4
50	1	0.6	91.0
51	1	0.6	91.6
55	2	1.2	92.8
56	2	1.2	94.0
64	1	0.6	94.6
66	1	0.6	95.2
76	1	0.6	95.8
81	1	0.6	96.4
84	1	0.6	97.0
88	1	0.6	97.6
92	2	1.2	98.8
126	1	0.6	99.4
146	1	0.6	100.0

3600 Samples, 167 Periods
Period Count: 21.6 average, 13.9 median

"4 AM run"

Period Count	Instances	Percent	Cumulative
1	11	6.4	6.4
2	13	7.6	14.0
3	4	2.3	16.4
4	2	1.2	17.5
5	3	1.8	19.3
6	1	0.6	19.9
7	6	3.5	23.4
8	1	0.6	24.0
9	3	1.8	25.7
10	4	2.3	28.1
11	5	2.9	31.0
12	4	2.3	33.3
13	4	2.3	35.7
14	4	2.3	38.0
15	7	4.1	42.1
16	11	6.4	48.5
17	9	5.3	53.8
18	5	2.9	56.7
19	6	3.5	60.2
20	5	2.9	63.2
21	4	2.3	65.5
22	2	1.2	66.7
23	5	2.9	69.6
24	5	2.9	72.5
25	2	1.2	73.7
26	7	4.1	77.8
27	2	1.2	78.9
28	3	1.8	80.7
30	2	1.2	81.9
31	3	1.8	83.6
32	1	0.6	84.2
34	2	1.2	85.4

37	3	1.8	87.1
38	1	0.6	87.7
39	2	1.2	88.9
40	1	0.6	89.5
41	1	0.6	90.1
42	2	1.2	91.2
43	1	0.6	91.8
45	1	0.6	92.4
49	1	0.6	93.0
53	3	1.8	94.7
54	1	0.6	95.3
59	1	0.6	95.9
63	1	0.6	96.5
69	1	0.6	97.1
73	1	0.6	97.7
79	1	0.6	98.2
84	1	0.6	98.8
143	1	0.6	99.4
153	1	0.6	100.0

3600 Samples, 171 Periods
Period Count: 21.1 average, 16.3 median

"5 AM run"

Period Count	Instances	Percent	Cumulative
1	11	2.0	2.0
2	1	0.2	2.2
3	17	3.1	5.4
4	87	16.1	21.4
5	122	22.6	44.0
6	114	21.1	65.1
7	62	11.5	76.5
8	46	8.5	85.0
9	30	5.5	90.6
10	8	1.5	92.1
11	7	1.3	93.3
12	5	0.9	94.3
13	2	0.4	94.6
14	5	0.9	95.6
15	2	0.4	95.9
16	4	0.7	96.7
17	3	0.6	97.2
18	2	0.4	97.6
19	3	0.6	98.2
20	2	0.4	98.5
21	2	0.4	98.9
22	1	0.2	99.1
25	1	0.2	99.3
26	1	0.2	99.4
28	1	0.2	99.6
40	1	0.2	99.8
45	1	0.2	100.0

3600 Samples, 541 Periods
Period Count: 6.7 average, 5.3 median

Hope this helps,
/tvb

57. [TACGPS:749] RE: TAC32 1.0.12 and CTL3D32.DLL

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Fri, 10 Oct 1997 22:48:35 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCD5D6.C8233740.rick@cnssys.com>
Rendered body type: text/plain

Boris,

This is disturbing. The main reason I am distributing TAC32 using InstallShield is this very issue. The installation contains both Windows 95 (ANSI) and Windows NT versions of CTL3D32.DLL. The installation should automatically install the correct version based on which operating system you have. They are both versions 2.31.000. The one for NT is 27,136 bytes while the Win95 file is 26,624 bytes. I just checked my InstallShield build instructions and they seem to be correct. I am at a loss to explain what happened unless it actually worked correctly and Lotus Notes just couldn't recognize the new version. I wonder if you could check this for me.

The other DLLs which are distributed with TAC32 are MSVCRT.DLL version 5.00.7128 and MFC42.DLL version 4.21.7160.

Rick
WB2TNL

-----Original Message-----
From: bsmeds@esoc.esa.de [SMTP:bsmeds@esoc.esa.de]
Sent: Friday, October 10, 1997 4:01 AM
To: tacgps@tapr.org
Subject: [TACGPS:742] TAC32 1.0.12 and CTL3D32.DLL

Shortly after installing TAC32 1.0.12 on a Windows 95 PC I get an error
message when starting Lotus Notes.

The error message : This application uses CTL3D32.DLL which is not the
correct version. This version of CTL3D32.DLL
is designed only for Windows NT systems.

It looks like the installation of TAC32 1.0.12 replaced my CTL3D32.DLL
from version 2.29.000 to 2.31.000
I did not see any other effects. After changing back to version 2.29.000
the error message disappeared.
Did anyone else notice that the file CTL3D32.dll changed after installing
TAC32 1.0.12?
I am not an expert on Win 95 but I thought it could be of interest to the
group.

Boris DJ0EX SM0GJ

58. [TACGPS:750] RE: TAC32 1.0.12 and CTL3D32.DLL

From: gregory.beat@mediaone.net (Gregory Beat)
Date: Sat, 11 Oct 1997 04:23:06 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <343F44C3.26B9A8A3@mediaone.net>
Rendered body type: text/plain

> Shortly after installing TAC32 1.0.12 on a Windows 95 PC I get
> an error
> message when starting Lotus Notes.

What version of Lotus Notes 4.0 ? 4.51 or 4.52?

Thaere are known compatibility bugs with earlier versions.
A:though I am not the Lotus Notes "expert" for the firm --
other members of the company do debug many of the "beta"
releases.

> The error message : This application uses CTL3D32.DLL which is
> not the
> correct version. This version of CTL3D32.DLL
> is designed only for Windows NT systems.

I could scan our internal bug list with Notes version number.

GB

59. [TACGPS:751] RE: TAC32 1.0.12 Problems

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sat, 11 Oct 1997 21:22:17 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCD693.595AF100.rick@cnssys.com>
Rendered body type: text/plain

Tom,

Fixed (1). All distribution variants updated. Do you have one of the in
between versions of the Motorola with the other bug (Version <8.8)?

(2) I have more work to do on the baud rate switching during setup. The
various serial port errors caused by trying a wrong port baud rate are
handled but one case may be handled wrong. I can't get this to happen very
often so I haven't been able to debug it.

Because this was so minor and doesn't effect anyone else, I did not update
the version number or announce it.

Rick

-----Original Message-----
From: Tom Clark (W3IWI) [SMTP:clark@tomcat.gsfc.nasa.gov]
Sent: Friday, October 10, 1997 1:14 AM
To: tacgps@tapr.org
Subject: [TACGPS:741] TAC32 1.0.12 Problems

Rick -- a couple more for your list

(1) with the latest bits you posted, the Geoid height correction
is being applied for the old (firmware 6.0) 6-channel PVT-6, but
the sign is wrong.

(2) In toggling between NMEA and BIN the software crashed. The
debugger in MS Developer Studio sez that it got "Unhandled Exception
in MFC42.DLL:0xC00000005: Access Violation"

See you tomorrow. I did get SHOWTIME running fine on the old Compaq
386-20 laptop -- even under DesqView and even with a graphical
Rolex watch program running in another DV window. Too bad the display
is a grubby monochrome LCD!

FYI -- the W3IWI-13 DGPS beacon is alive again on 145.79, with
a beacon rate of once/15 seconds. Probably adequate if not many
packets are lost, but 145.79 sounded like a DX pileup with so
many people in town for the DCC.

73, Tom

60. [TACGPS:752] RE: TAC32 1.0.12 and CTL3D32.DLL

From: bsmeds@esoc.esa.de
Date: Sun, 12 Oct 1997 04:51:47 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <C125652E.003468BA.00@esocmail1.esoc.esa.de>
Rendered body type: text/plain

Rick,
I have checked to install TAC32 1.0.12 at home and I do not see any problem
with a wrong DLL.
I did also install another program at work last week, and I will check on
Monday if the installation of that program was selecting the NT version
DLL.
Thanks for the explanation that the CTL3D32.DLL exists in two versions (NT
and Win95) with the same version number.
Boris
DJ0EX, SM0GJ.

---------------------- Forwarded by Boris Smeds/esoc/ESA on 97-10-12 12:31
----

rick @ cnssys.com
97-10-11 05:48

Please respond to tacgps@tapr.org

To: tacgps @ tapr.org
cc: (bcc: Boris Smeds/esoc/ESA)
Subject: [TACGPS:749] RE: TAC32 1.0.12 and CTL3D32.DLL

Boris,

This is disturbing. The main reason I am distributing TAC32 using
InstallShield is this very issue. The installation contains both Windows
95 (ANSI) and Windows NT versions of CTL3D32.DLL. The installation should
automatically install the correct version based on which operating system
you have. They are both versions 2.31.000. The one for NT is 27,136 bytes
while the Win95 file is 26,624 bytes. I just checked my InstallShield build
instructions and they seem to be correct. I am at a loss to explain what
happened unless it actually worked correctly and Lotus Notes just couldn't
recognize the new version. I wonder if you could check this for me.

The other DLLs which are distributed with TAC32 are MSVCRT.DLL version
5.00.7128 and MFC42.DLL version 4.21.7160.

Rick
WB2TNL

-----Original Message-----
From: bsmeds@esoc.esa.de [SMTP:bsmeds@esoc.esa.de]
Sent: Friday, October 10, 1997 4:01 AM
To: tacgps@tapr.org
Subject: [TACGPS:742] TAC32 1.0.12 and CTL3D32.DLL

Shortly after installing TAC32 1.0.12 on a Windows 95 PC I get an error
message when starting Lotus Notes.

The error message : This application uses CTL3D32.DLL which is not the
correct version. This version of CTL3D32.DLL
is designed only for Windows NT systems.

It looks like the installation of TAC32 1.0.12 replaced my CTL3D32.DLL
from version 2.29.000 to 2.31.000
I did not see any other effects. After changing back to version 2.29.000
the error message disappeared.
Did anyone else notice that the file CTL3D32.dll changed after installing
TAC32 1.0.12?
I am not an expert on Win 95 but I thought it could be of interest to the
group.

Boris DJ0EX SM0GJ

61. [TACGPS:753] Garmin 30

From: Tony Flusche AB6BR <TonyF@worldnet.att.net>
Date: Sun, 12 Oct 1997 21:21:18 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19971012191457.006bf8cc@postoffice.worldnet.att.net>
Rendered body type: text/plain

I received my Garmin GPS-30pc Friday. It works well except apparently the
internal battery is dead. It looses all settings and takes 15 min to
acquire if its turned off. Has any one cut the molded DB-9 off yet to see
if all the wires in the doc are there? It would be a simple mater to power
to the yellow wire for backup power.

When Timothy Leary reenters the atmosphere will he cause acid rain?

Tony Flusche AB6BR

62. [TACGPS:754] Re: Garmin 30

From: "Ronald G. Parsons" <w5rkn@amsat.org>
Date: Sun, 12 Oct 1997 21:47:35 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <34418AC1.B49023CF@amsat.org>
Rendered body type: text/plain

The ONLY wires connected between the "GPS 20" inside the GPS 30 and the
DE-9/power connector are the following.

DE-9   GPS
----   ----
2   4 white TXD1 Serial output
3   5 blue RXD1 Serial Input
5   Shield Ground

Power
Plug   GPS
-----   ----
Tip   9   I assume there is regulation via this pin
Shank   8   Ground

all others N/C

Ron

Tony Flusche AB6BR wrote:
>
> I received my Garmin GPS-30pc Friday. It works well except apparently the
> internal battery is dead. It looses all settings and takes 15 min to
> acquire if its turned off. Has any one cut the molded DB-9 off yet to see
> if all the wires in the doc are there? It would be a simple mater to power
> to the yellow wire for backup power.
>
> When Timothy Leary reenters the atmosphere will he cause acid rain?
>
> Tony Flusche AB6BR

--
Ron W5RKN

also:
rparsons@bga.com

63. [TACGPS:755] JAVA application for GPS30PC!

From: Jim Chandler <jchandle@flash.net>
Date: Mon, 13 Oct 1997 00:20:04 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.2.32.19971013001831.006b41d0@pop.flash.net>
Rendered body type: text/plain

I got my GPS30PC in the mail on Friday and it works great!! Thanks to Greg
and the TAPR staff.

I have written a JAVA application that acts as an display interface for the
unit. It reads the input from a serial port (or a file or standard
input....) and parses the GPS30PC output and displays a lot of the useful
information (lat, long, date, time, velocity, etc). I need to do some
documentation for it, and would be happy to share it. I hope to upload it
to the TAPR ftp site later this week. I would like to hear constructive
comments about the interface and requests for any additional fields to be
isplayed. Anybody interested?

73 de N0VH

Jim Chandler, N0VH
jchandle@flash.net
http://www.flash.net/~jchandle
Use the following PGP public key: 207BDE21
Do not use E55C3449 or 72B3C695 as I can no longer decrypt them.

64. [TACGPS:756] Re: JAVA application for GPS30PC!

From: Lyle Johnson <lylej@azstarnet.com>
Date: Mon, 13 Oct 1997 09:18:15 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19971013071059.0075b394@pop.azstarnet.com>
Rendered body type: text/plain

Jim,

Please post it to the FTP site. I'm sure many of us wil be interested to
see what you've done!

Lyle

>...I have written a JAVA application that acts as an display interface for
the
>unit. It reads the input from a serial port (or a file or standard
>input....) and parses the GPS30PC output and displays a lot of the useful
>information (lat, long, date, time, velocity, etc). I need to do some
>documentation for it, and would be happy to share it. I hope to upload it
>to the TAPR ftp site later this week. I would like to hear constructive
>comments about the interface and requests for any additional fields to be
>isplayed. Anybody interested?...

65. [TACGPS:757] CTL3D32.DLL

From: bsmeds@esoc.esa.de
Date: Mon, 13 Oct 1997 11:22:01 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <C125652F.00586733.00@esocmail1.esoc.esa.de>
Rendered body type: text/plain

I have not been able to reproduce the incorrect installation of the
CTL3D32.DLL file I observed last week with any of the other programs
either.
It was most likely not caused by TAC32.
Regards
Boris DJ0EX SM0GJ

66. [TACGPS:758] RE: CTL3D32.DLL

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Mon, 13 Oct 1997 11:41:04 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCD7D4.1547D900.rick@cnssys.com>
Rendered body type: text/plain

Boris,

Thank you for your effort. Had there been a bug I wanted to fix it right away.

Rick
WB2TNL

-----Original Message-----
From: bsmeds@esoc.esa.de [SMTP:bsmeds@esoc.esa.de]
Sent: Monday, October 13, 1997 12:22 PM
To: tacgps@tapr.org
Subject: [TACGPS:757] CTL3D32.DLL

I have not been able to reproduce the incorrect installation of the
CTL3D32.DLL file I observed last week with any of the other programs
either.
It was most likely not caused by TAC32.
Regards
Boris DJ0EX SM0GJ

67. [TACGPS:759] TIC...TAC...TOC at DCC

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Mon, 13 Oct 1997 23:47:49 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3442EA7D.4EF6@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

The TAPR/ARRL meeting this past weekend is now history. I think
our part went pretty well, but it sure was a busy time for me!

Friday I gave an ad hoc presentation in K3MC's session "RF for
Digital Weenies" -- described my cheap and reproducable 2-turn
GPS helix antenna and the RF tricks that it showed. Lots of folks
seemed very interested that a good antenna could be built in an
hour or two by folks who had never done a microwave project before.
Ended up selling about 70 of the ERA-3 MMIC LNAs to the folks who
were getting interested in do-it-yourself microwave projects. Now
all I have to do is to get the design written up for publik
distribution!

Saturday AM I gave an hour-long tutorial on what GPS is, how the
system works etcetera. Then Saturday afternoon I gave a 30ish
minute presentation on the TAC project. Rick and I had 4 working
TACs set up (an original TAC, two TAC-2's with ONCOREs, and a TAC-2
with a GPS-20) running on both SHOWTIME & TAC32.

Rick was able to show that K3VDB's Garmin/TAC32 problems were not
in TAC32. He discussed with a lot of people his development ideas
for TAC32.

Last week, I re-instated my W3IWI-13 DGPS beacon for the APRSers,
and it invoked a lot of interest. Rick & I discussed with a number
of the people interested in amateur DGPS the fact that the ONCORE
already can be used as a (Motorola proprietary) DGPS and the fact
that we hope to write the software that will convert the existing
ONCOREs into RTCM SC-104 beacons.

The biggest interest in the TAC project came in the area of the
TOC, with lots of people asking "when can I buy one?". In all the

discussions it continued to come out that we need to think very seriously about which xtal oscillator we include in the default (ranging from the "cheap" to "good" types I plotted on the AV cureves). Nobody I talked to had any "magic silver bullet" TCXO/ OCXO that they knew about. I still keep coming down to three possibilities:

 a. a cheap (like $20) off-the-shelf TCXO
 b. a more expensive (like $100-$200) TXCO/OCXO
 c. a design where we get a pretty good xtal, and then have the people build it themselves. But for this, we need to find a person good at designing high-stability xtal oscillators!

Then we hit another set of options for cases a. and c.:

 d. Start with a fairly cheap oscillator and add some sort of temperature control/stabilization. This could range from the Murata clip-on ovens, to a good tight proportional control oven.
 e. Or it could involve isolating the oscillator from the ambient environment. Here we could have the folks put the fairly cheap oscillator into a Thermos bottle that is filled with styrofoam beads.
 f. Or we could try to do it all in disciplining software, coming up with some scheme for the embedded microprocessor to "learn" everything about the oscillator's performance.

For any of the above approaches, I'd sure like to see a "Mister Oscillator" step forward to do some market & literature research and make a real recommendation to us! In addition to a. thru f., there's another (non-exclusive) option I'd like to make sure that we include:

 g. For the folks who already have a good xtal (HP, Tracor, Sulzer or in several cases, as few of us have found surplus Rubidium standards), the ability to substitute it for the default that would be supplied in the TOC.

After last week's tacgps mail, plus my own thoughts in preparing the DCC talk, plus conversations at the DCC, I have done a bit more thinking about what I think we should pour into the Field Programmable ASIC. I am really getting more and more convinced that this is the way to go. I have been mulling over TVB's scheme of grabbing the count in the frequency standard's coundown divider instead of using a separate time-interval counter and I like the idea. Brooks reported that he had good luck with the 18-bit Burr Brown D/A converter, while Lyle & I had been thinking of the part-per-million D/A made using BCD rate multipliers (which would be built into the ASIC and use the same countdown divider that is used for everything else). I'd sure like some feedback on these two approaches!

Like I said, I really like the idea of dropping all the counter/ latch/serial load registers/etcetera into an ASIC. So far the only person who has indicated that he has the knowledge/resources to be our "Mister VHDL" is Lyle Johnson (WA7GXD), and he has a very full plate getting the RUDAK hardware ready for the AMSAT P3D satellite and at work. Can we recruit someone else? Volunteers, please speak up!

I saw several of the tacgps folks at the DCC. I was worried that all the heuristic discussions on Allan Variances, Disciplining loops vs PLLs vs TLLs, etcetera might not be of interest to all the tacgps folks; I was pleasantly surprised at how many people indicated that they were learning a lot from eavesdropping on the dialogue and encouraged us to keep it public. Thanks to all who made comments for the vote of confidence.

I wonder who of the TACers will be at next weekend's AMSAT meeting in Toronto?

Please make some feedback comments! Gotta run to be now (most elated also because the Orioles just won!) 73, Tom

68. [TACGPS:760] Re: Results on TAC-2 measurements

From: "James L. Johnson" <jjjohnson@saiph.hpl.hp.com>
Date: Tue, 14 Oct 1997 11:46:06 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199710141644.JAA26977@saiph.hpl.hp.com>
Rendered body type: text/plain

Hello Tom (tvb),

Well, you're way ahead of me on the specifics of the
HP58503. I was out of the office yesterday (10-13) and the
unit I borrowed was on my desk this morning when I came in,
so I'm going to start looking at it ASAP. I have a contact
at the division that makes the 58503 so I'm going to ask him
all of your questions - thanks for asking them! Stay tuned
for more info as it becomes available.

73,

Jim W6SC
jjohnson@hpl.hp.com

> For another data point, the OCXO in the HP 58503A I've been
> using is a 10811-60159. In a conversation with HP last year
> I was told this variation of the standard 10811D OCXO has
> an extended EFC range specification. It enables the 58503
> to continue to be software disciplined, without maintenance,
> in spite of years of oscillator ageing and without requiring
> the user to ever turn a coarse adjustment screw. I have specs
> on the 10811 OCXO family but not the special -60159 model
> so I can't confirm this report but it sounds plausible.
>
> I also recall them saying that the HP 58503A tracks ambient
> temperature and factors that into the control voltage, at
> least during hold-over.
>
> It would be nice, Jim, if you could confirm or elaborate on
> any of this.
>
> Based on my tests, I have to agree with Tom Clark's earlier
> comment about the short-term (1 to 1000 s) stability of
> the HP 58503A. I found it surprisingly poor compared to a
> stand-alone 10811D or other high-end OCXO.
>
> I once remarked to HP that the 58503A must have at least a
> 24-bit DAC and extremely low tempco voltage references in
> order to work unattended for years. The answer I got was:
> no, because of the software PLL it wasn't necessary to have
> extremely precise DACs or voltage references: the control
> voltage is adjusted as necessary regardless whether the
> phase error is the result of oscillator ageing, poor DAC
> or EFC resolution, or ambient temperature effects on the
> analog ICs or the OCXO. Interesting.
>
> I have a number of 10811 or equivalent OCXO's and after
> running for months or years many of them have ageing rates
> one or two orders of magnitude below their 5e-10 spec. But
> a typical tempco for these is 2.5e-9 for 0 to 50 C which
> (assuming linear) is 5e-11/C. Since I often see a 10 C
> temperature change in my lab (garage), this net 5e-10 daily
> temperature-induced error *totally* dominates the medium
> term (1000 to 100000 s) stability of these references.
>
> /tvb
>
>

69. [TACGPS:761] Re: TOC -- Block Diagram

From: Brooks Shera <ebs@lanl.gov>
Date: Tue, 14 Oct 1997 14:13:32 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199710141801.MAA23364@newreg.lanl.gov>
Rendered body type: text/plain

Hi Wis,

A common power supply can certainly be a source of coupling. The VCOs
I have tried all run off a separate supply.

However the input amplifier that is supposed to amplify and buffer the
VCO rf output from the logic circuits may be a potential culprit since it
is
on the logic board and runs off the logic supply. I found that using a
x10
scope probe to connect the VCO rf to the logic board helps to solve the
problem,

presumably because it attenuates rf flowing back in to the VCO.

It works, but I'm not sure I want to publish a circuit with a scope probe
wired into it! I guess a 100 Meg series resistor might do as well.

My guess is that the DC bias network for the first stage of the amplifier
(which is internal to the amplifier IC) puts a little noise on the input
which then is injected back to the VCO via its output. Sinister.

Thanks for your comment.

-Brooks

>Regarding VCO false locking:
>
>> [. . .]
>>
>>
>> I found that my VCO was readily captured and phase locked by
>> circuit noise from the GPS 1 pps ticks. The noise could get into
>> the VCO via the voltage control line or couple back into the VCO
>> rf output.
>>
>> [. . .]
>

>Have you ruled out noise coupling through the power supply? It
>seems this could easily introduce errors at the analog levels of
>interest here. Perhaps a separate supply for the VCO would be in
>order?

70. [TACGPS:762] GPS30pc EPE

From: Phil Reed <pcr@ic.net>
Date: Sat, 18 Oct 1997 09:45:48 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19971018104351.031cafcc@ic.net>
Rendered body type: text/plain

Received my GPS30pc this week. It's currently on the roof,
feeding the excellent SA Watch program. My question is this:

The GPS30 is reporting an EPE on the order of 50 meters. When I
take it out and substute my GPS12xl (also with an external antenna
on the roof, right next to the GPS30), the GPS12 reports an EPE about
1/3 that of the GPS30. These measurements are taken at the same time:

GPS30 EPE - 53 meters
GPS12XL EPE - 15.7 meters

What's going on? Is the GPS12 just a better receiver, doing a better
job?

...phil

71. [TACGPS:763] Re: GPS30pc EPE

From: Dave Martindale <davem@cs.ubc.ca>
Date: Sat, 18 Oct 1997 10:15:46 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <l03102000b06e8b4c06c9@[198.162.38.159]>
Rendered body type: text/plain

>The GPS30 is reporting an EPE on the order of 50 meters. When I
>take it out and substute my GPS12xl (also with an external antenna
>on the roof, right next to the GPS30), the GPS12 reports an EPE about
>1/3 that of the GPS30. These measurements are taken at the same time:
>
>GPS30 EPE - 53 meters
>GPS12XL EPE - 15.7 meters
>
>What's going on? Is the GPS12 just a better receiver, doing a better
>job?

The 12XL *is* a better receiver. The 30 has one single channel of
receiver, sampling data from up to 8 satellites in (probably) round-robin
fashion. Thus, it is collecting signal from a single satellite about

1/8 of the time. The 12XL has 12 parallel channels, each one dedicated
to a satellite.

The result is that the data coming from the 12XL's receiver is less
noisy, since it averages the signal from each satellite over a period
8 times as long as the 30 does. That's good for several dB of signal-to-
noise improvement. In addition, the 12XL may be tracking some satellites
that the 30 is not, if there are more than 8 in the sky. This improves
the geometry. The 12XL (and probably the 30 as well) calculate an
"overdetermined" solution, where data from all satellites is used to
compute position - not just the best 4.

All of this means that the 12XL (or the 25/35, the parallel receiver
equivalent of the 20/30) do compute more accurate positions.

On the other hand, Garmin doesn't publish exactly what EPE means. It
is quite possible that they do not include the effects of SA. There has
also been speculation that they are one-sigma estimates (the error is
less than this 68% of the time) rather than two-sigma (error less than
this 95% of the time) which is the way SA's "100 meter" error is quoted.
SA error is less than 50 meters 68% of the time.

So, for example, the total two-sigma error from both SA and the receiver/
geometry error might be:

        30: sqrt(100^2 + (2*53)^2) = 146 m
        12: sqrt(100^2 + (2*15.7)^2) = 105 m

So the error in navigation would be dominated by SA in both cases.

However, this is just a guess. Garmin does not publish how they calculate
EPE, or even state that the 30 and 12XL figures can be compared with each
other.

Of course, if you fed DGPS corrections to both receivers, thus eliminating
the effects of SA and other atmospheric errors, then looked at the stability
of the output, you would see just how good the two receivers were. I expect
that the 12XL would be substantially better than the 30 in this case.

        Dave

72. [TACGPS:764] GPS WANTED

From: ww0e@juno.com
Date: Sat, 18 Oct 1997 17:08:16 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <19971018.164519.7350.9.ww0e@juno.com>
Rendered body type: text/plain

WANTED TO BUY:
GPS RECEIVER - 12 CHANNEL, NMEA,
DETACHABLE ANTENNA ?

THANKS - de JERRY-WW0E   ww0e@juno.com

73. [TACGPS:765] Question

From: "James L. Johnson" <jjjohnson@saiph.hpl.hp.com>
Date: Mon, 20 Oct 1997 12:47:46 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199710201742.KAA05654@saiph.hpl.hp.com>
Rendered body type: text/plain

Hello,

   Somebody mentioned a parameter called "EPE". I don't
know about that one - what does it mean?

   Tnx,

   Jim W6SC

74. [TACGPS:766] Re: Question

From: "Larry P. Thomas WA0GWA" <lpthomas@winning-edge.com>
Date: Mon, 20 Oct 1997 13:01:03 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.32.19971020125432.01085354@winning-edge.com>
Rendered body type: text/plain

Estimated Positional Error

At 12:47 PM 10/20/97 -0500, you wrote:
>Hello,
>
>   Somebody mentioned a parameter called "EPE". I don't
>know about that one - what does it mean?
>
>   Tnx,
>
>   Jim W6SC
>
>

 Larry P. Thomas wa0gwa   voice : 1 913 888-0282
 Krell Technologies   fax : 1 913 782-9359
 8960 Bond   pager : 1 816 989-HELP
 Overland Park, KS   www : http://www.krell.com
 66214-1764   e-mail : mailto://lpthomas@winning-edge.com

---

75. [TACGPS:767] Re: TAC-2 Schematics

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Mon, 20 Oct 1997 13:44:26 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <v03110706b07152c10bdc@[208.134.134.40]>
Rendered body type: text/plain

Just an update.

Steve Bible is taking everyones comments and questions and is editing the
assembly and operations manuals.

Will let you know when they are complete and on the web page. One of the
issues is that I'll have to recreate the assembly manual -- since it was
lost when I had a HD crash in August (between the weekly backups).

Also, the schematics are in the ftp area (the latest ones for the boards
that in the kit). There is a page of them missing in the docs in the kit.

<ftp://ftp.tapr.org/tapr/tac2/schematics/>

Cheers - Greg

Greg Jones, WD5IVD
Austin, Texas
wd5ivd@tapr.org
http://www.tapr.org/~wd5ivd

76. [TACGPS:769] Re: Question

From: Tom Van Baak <tvb@veritas.com>
Date: Mon, 20 Oct 1997 15:02:58 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <344BB618.124@veritas.com>
Rendered body type: text/plain

James L. Johnson wrote:
>
> Hello,
>
>   Somebody mentioned a parameter called "EPE". I don't
> know about that one - what does it mean?
>
>   Tnx,
>
>   Jim W6SC

See Sam Wormley's recent reply below.
/tvb

>From   Sam Wormley <swormley@cnde.iastate.edu>
Organization   Iowa State University
Date   14 Oct 1997 15:23:46 GMT
Newsgroups   sci.geo.satellite-nav

boston3455@aol.com (Boston3455) wrote:
>Has anyone taken any observations as to the relationship between Garmin
> (specifically the 12XL) EPE and DOP. To put this another way, what percentage
> of observations are within the EPE. What factor should I apply to EPE to come
> up with a 95% probability?
>
>Steve Baxter

Wish I knew that answer....

Garmin does not give an explanation for the EPE calculation displayed on
a number of their handheld receivers. EPE is an acronym for "Estimated
Position Error". See page 18 of the GPS 12XL Owner's Manual and
Reference.
The behavior of EPE is not identical on all of Garmin's receivers...
some
reflect the dgps mode and others do not.

A number of sources indicate the error in position can be estimated by
the
simple calculation DOP * URA with the former calculated in the GPS
receiver
from the geometry of the satellites used in the position solution and
the
later derived and computed from the GPS message transmitted by each
satellite.

DOP - Dilution of Precision - TDOP, PDOP, HDOP, VDOP, etc. are, in
effect,
multipliers that, when used with some measure of positioning statistic,
can
give you a realistic expectation of probability of error.

URA - User Range Accuracy - this is a quantity that is transmitted in
the
navigation message that is the predicted (not measured) statistical
ranging
accuracy. Since it is defined for SPS (Standard Positioning Service),
it
includes SA.

Bill Stone wrote [March 1997]:

>I will see if I can provide a little bit more detailed information regarding
>our EPE algorithm. Sam is basically correct, DOP x UERE = EPE. I tried to
>put it into more of layman's terms.
>
>Thank you and best regards,
>
>GARMIN International
>1200 E. 151st Street
>Olathe, KS 66062 USA

What does Garmin mean by EPE?

EPE = HDOP * URA (1-sigma) would give a measure of the 68% confidence
circle,
i.e., 68% of your position fixes would fall within and 32% would fall
outside.

EPE = HDOP * URA (1-sigma) * 2 gives a measure of the 95% confidence
circle,
i.e., 95% of your position fixes would fall within and 5% would fall
outside.

EPE = HDOP * URA (1-sigma) * 0.73 gives a measure of the 50% confidence
circle,
i.e., 50% of your position fixes would fall within and 50% would fall
outside.
This is also known in the literature as CEP (Circular Error Probable).

This latter expression is what several of you have indicated that you
think
Garmin's EPE calculation is for the Garmin 12XL. There may also be an
"EPE filter" to minimize the EPE figure from jumping about to much.

"A measurement is worth a thousand expert opinions"

There should be a "reasonable correlation" between HDOP and outer radial position from a known geodetic point (could be determined over a long period of time by statisical averaging). I use the word "reasonable" because the comparison involves the points wandering around mostly within a circle of confidence, whereas HDOP will relate to the radius of that circle of confidence.

To further complicate the analysis, witout an absolutely clear view of the sky, you can expect the HDOP to take jumps as satellites are obstructed from view. This might not be a bad idea to collect data under conditions less than desireable. John Franke reports:

> "It is interesting to see what happens under certain alinements. I recently had a case where the receiver (6 channel, parallel) was tracking 4 satellites but was doing 2D NAV and the HDOP was 32. A quick look at the satellite position screen showed the 4 tracked satellites to be in a straight line. There were other satellites available but the view to them was blocked by buildings. So, knowing the orbits repeat but are several minutes earlier each day, I watched the next day to see the alinement develop and the PDOP change. In less than twenty minutes the receiver went from 3D NAV with a PDOP of 2.3 to 2D NAV and a HDOP of 30 back to 3D NAV and PDOP of 2.4! Quite impressive and educational to observe".

The NMEA sentence $GPGGA recorded periodically over at least a twenty-four-hour period may provide enough data to draw a conclusion. This is a good experiment for all to try who have the capability to capture data.... you will learn much.

Many of you may have better approaches than mine to gather and analyse data to resolve the EPE issue.... and, of course it goes without saying, we would hold Garmin in high[er] esteem if Garmin would give a complete technical discription of the calculation. And... if that technical language is over the typical readership heads, I'm sure there are many qualified to translate.

_____
Sam Wormley - http://www.cnde.iastate.edu/gps.html

77. [TACGPS:771] Re: TAC-2 Schematics

From: Boyd Prestwood <w2hob@mosquito.com>
Date: Mon, 20 Oct 1997 19:48:50 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19971020204204.006abb08@mail.mosquito.com>
Rendered body type: text/plain

At 01:44 PM 10/20/97 -0500, you wrote:
>Just an update.
>
>Steve Bible is taking everyones comments and questions and is editing the
>assembly and operations manuals.
>
>Will let you know when they are complete and on the web page. One of the
>issues is that I'll have to recreate the assembly manual -- since it was
>lost when I had a HD crash in August (between the weekly backups).
>
>Also, the schematics are in the ftp area (the latest ones for the boards

>that in the kit). There is a page of them missing in the docs in the kit.
>
><ftp://ftp.tapr.org/tapr/tac2/schematics/>
>
>
>Cheers - Greg

W2HOB RESPONSE: I bought a TAC-2 and a Motorola ONCORE VP at DCC and it's up and running like a charm. I had no problems with assembly... SHOWTIME crashes every 15-20 minutes but want to try another computer before I ask why! I assembled only the parts supplied, which was for the ONCORE, so I don't know about the other parts that would support the other GPS receivers. Assembly manual was clear and concise for me. Operational manual was informative.

Thanks a bunch Dr. Tom and everyone else involved... it's a nifty project!

73 de Boyd W2HOB
w2hob@mosquito.com
TAPR 5513

78. [TACGPS:773] Re: Question

From: "James L. Johnson" <jjjohnson@saiph.hpl.hp.com>
Date: Tue, 21 Oct 1997 11:03:39 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199710211556.IAA10251@saiph.hpl.hp.com>
Rendered body type: text/plain

>
> See Sam Wormley's recent reply below.
> /tvb
>
> --------
>
> >From   Sam Wormley <swormley@cnde.iastate.edu>
> Organization   Iowa State University
> Date   14 Oct 1997 15:23:46 GMT
> Newsgroups   sci.geo.satellite-nav
>

Thanks Tom (vb) for the info and thanks to the others who replied to my query about EPE. I was wondering why I couldn't find it in my GPS literature - it seems to be a Garmin invention. I learned a lot from your response, Tom - thanks!

  Jim W6SC

79. [TACGPS:774] SA Watch/GPS20-30

From: "Rosenberg.Eric"<rosenberg.eric@orbcomm.com>
Date: Wed, 22 Oct 1997 12:48:08 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <9710228775.AA877527994@occgate.orbcomm.com>
Rendered body type: text/plain

As I haven't built (started) my TAC-2 kit yet, I've been running my
     GPS-30PC running with SA Watch.

     I noticed that with the unregistered version, it says that the Datum
     is not available.

     Is this a 'feature' of the unregistered version? Are there any other
     items that don't work with the unregistered version?

     Thanks,
     Eric W3DQ

     rosenberg.eric@orbcomm.com

80. [TACGPS:775] Re: TACGPS digest 55

From: Phil Reed <pcr@ic.net>
Date: Wed, 22 Oct 1997 21:28:23 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19971022190229.0316b300@ic.net>
Rendered body type: text/plain

I ran the unregistered SA Watch on my GPS 12XL, and it did indeed
report the datum. I therefore conclude that the GPS30 doesn't provide
the dataum. This guess is reinforced by reviewing the documentation

for the GPS30, which doesn't appear to have a sentence that says
what datum is in use.

...phil

At 12:55 PM 10/22/97 -0500, you wrote:
>
>
>   As I haven't built (started) my TAC-2 kit yet, I've been running my
>   GPS-30PC running with SA Watch.
>
>   I noticed that with the unregistered version, it says that the Datum
>   is not available.
>
>   Is this a 'feature' of the unregistered version? Are there any other
>   items that don't work with the unregistered version?

81. [TACGPS:776] What Should We See?

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Thu, 23 Oct 1997 21:36:37 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199710240230.WAA10995@aus-f.mp.campus.mci.net>
Rendered body type: text/plain

Hello,

Charlie, W4OQM, and I, W4DH, just unpacked the box with the Garmin and & TAC
kits. We figured the first order of business was to check the Garmin GPSs.
To wit, we plugged them into 12 v DC, RS 232 with Windows "Terminal"
program, and placed the unit outside the room with a clear sky view. On
both units we get ASCII "sentences." Good--not totally dead. On one unit,
after a while (after 1/2 to 1 hour) saw 8 satellites, but the time was off
(by 20 minutes and some odd seconds), the "V" in the GPVTG record showed,
the db fields for each satellite were null, and the lat/long fields were
null with a "0," all indicating that it was not tracking. The other unit
did not show any sats. After we had dinner we checked the records (3 hours
elapsed time) and it was showing 6 sats, the correct time, but not lat/long
nor indications of tracking. Here is a clip from the terminal program.

$GPGSV,2,1,08,02,06,267,,03,39,048,,15,09,153,,18,43,222,33*76
$GPGSV,2,2,08,19,63,318,35,22,08,072,,27,21,310,,31,77,095,*77
$PGRME,,,,,,*4D
$GPVTG,,T,,M,,N,,K*4E
$GPRMC,021918,V,,,,,,,241097,,*3B
$GPGGA,021918,,,,,0,00,,,M,,M,,*65
$GPGSA,A,1,,,,,,,,,,,,,,,*1E
$GPGSV,2,1,08,02,06,267,,03,39,048,,15,09,153,,18,43,222,33*76
$GPGSV,2,2,08,19,63,318,35,22,08,072,,27,21,310,,31,77,095,*77

We're not sure what we should we should be seeing. Might both units have
problems with the antenna, hence they are not tracking? What *should* we see?

73's
Don, W4DH

82. [TACGPS:777] Re: What Should We See?

From: Dave Martindale <davem@cs.ubc.ca>
Date: Fri, 24 Oct 1997 00:40:56 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <l03102000b075f11d5576@[198.162.38.159]>
Rendered body type: text/plain

>We're not sure what we should we should be seeing. Might both units have
>problems with the antenna, hence they are not tracking? What *should* we see?

Here's the output of a running GPS 20. The 30 should be basically the
same, though there might be a sentence or two difference (since the 30
is likely a 20 SL board, not the older 20).

Note: if you look closely, there's one odd-looking time. This is when
the last leap second occurred.

        Dave

$GPRMC,235959,A,4913.2184,N,12305.9266,W,0.0,199.2,300697,020.3,E*62
$GPGGA,235959,4913.2184,N,12305.9266,W,1,05,2.1,34.3,M,-17.6,M,,*40
$GPGSA,A,3,,03,,17,21,23,,31,,,,,3.5,2.1,2.8*38
$GPGSV,2,1,08,01,23,185,,03,53,259,48,09,13,087,,17,35,108,34*73
$GPGSV,2,2,08,21,71,256,42,23,66,059,46,26,13,039,,31,33,306,46*75

```
$PGRME,101.0,M,130.0,M,164.6,M*29
$GPVTG,199.2,T,178.9,M,00.0,N,00.0,K*4A
$GPRMC,235960,A,4913.2182,N,12305.9267,W,0.0,199.2,300697,020.3,E*6F
$GPGGA,235960,4913.2182,N,12305.9267,W,1,05,2.1,34.2,M,-17.6,M,,*4C
$GPGSA,A,3,,03,,17,21,23,,31,,,,,3.5,2.1,2.8*38
$GPGSV,2,1,08,01,23,185,,03,53,259,48,09,13,087,,17,35,109,34*72
$GPGSV,2,2,08,21,71,256,42,23,66,059,46,26,13,039,,31,33,306,46*75
$PGRME,101.0,M,130.0,M,164.6,M*29
$GPVTG,199.2,T,178.9,M,00.0,N,00.0,K*4A
$GPRMC,000000,A,4913.2180,N,12305.9266,W,0.0,199.2,010797,020.3,E*64
$GPGGA,000000,4913.2180,N,12305.9266,W,1,05,2.1,33.7,M,-17.6,M,,*46
$GPGSA,A,3,,03,,17,21,23,,31,,,,,3.5,2.1,2.8*38
$GPGSV,2,1,08,01,23,185,,03,53,259,48,09,13,087,,17,35,109,34*72
$GPGSV,2,2,08,21,71,256,42,23,66,059,46,26,13,039,,31,33,306,46*75
$PGRME,101.0,M,130.0,M,164.6,M*29
$GPVTG,199.2,T,178.9,M,00.0,N,00.0,K*4A
```

83. [TACGPS:778] Re: What Should We See?

From: "Chandler, Jim" <jchandler@dsatex.com>
Date: Fri, 24 Oct 1997 07:58:28 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <97Oct24.075556cdt.26881@texas.dsatex.com>
Rendered body type: text/plain

It looks like your GPS is doing fine, but it is not showing a valid position. The most likely reason is that it

can't see enough GPS sats with good spatial diversity. I have the same problem if I put my GPS30

in the window sill or just outside the window. Since it can only see a little over half the sky, it is only getting

information from sats will roughly the same angle of arrival of signal. I had to reach out the window and

put it on the roof so that it now sees about 80% of the sky and it is fine.

I have been working on a JAVA application that parses these NMEA sentences for display and will post it

to the tapr ftp site this weekend. I have attached a JPG of the window so you can get some idea of the information

it will provide. Unfortunately, even though it is JAVA, it will only run on PCs running Windows right now. This is due to

the fact that I needed some libraries to talk to the serial port and I only have windows libs. I'll announce the programs

availability here after I post it. You will need to get the Java Development Kit (JDK) or Java Runtime Environment (JRE)

from java.sun.com to run this application. At some point I may make it an applet to run within IE or Netscape Communicator.

>Hello,

>

>Charlie, W4OQM, and I, W4DH, just unpacked the box with the Garmin and & TAC

>kits. We figured the first order of business was to check the Garmin GPSs.

>To wit, we plugged them into 12 v DC, RS 232 with Windows "Terminal"

> program, and placed the unit outside the room with a clear sky view. On

>both units we get ASCII "sentences." Good--not totally dead. On one unit,

>after a while (after 1/2 to 1 hour) saw 8 satellites, but the time was
off

>(by 20 minutes and some odd seconds), the "V" in the GPVTG record
showed,

>the db fields for each satellite were null, and the lat/long fields were

>null with a "0," all indicating that it was not tracking. The other
unit

>did not show any sats. After we had dinner we checked the records (3
hours

>elapsed time) and it was showing 6 sats, the correct time, but not
lat/long

>nor indications of tracking. Here is a clip from the terminal program.

>

>$GPGSV,2,1,08,02,06,267,,03,39,048,,15,09,153,,18,43,222,33*76

>$GPGSV,2,2,08,19,63,318,35,22,08,072,,27,21,310,,31,77,095,*77

>$PGRME,,,,,,*4D

>$GPVTG,,T,,M,,N,,K*4E

>$GPRMC,021918,V,,,,,,,241097,,*3B

>$GPGGA,021918,,,,,0,00,,,M,,M,,*65

>$GPGSA,A,1,,,,,,,,,,,,,,,*1E

>$GPGSV,2,1,08,02,06,267,,03,39,048,,15,09,153,,18,43,222,33*76

>$GPGSV,2,2,08,19,63,318,35,22,08,072,,27,21,310,,31,77,095,*77

>

>We're not sure what we should we should be seeing. Might both units
have

>problems with the antenna, hence they are not tracking? What *should*
we see?

>

>73's

>Don, W4DH

>
[Attachment: GPSDISP.JPG; application/octet-stream; 46,365 bytes]

84. [TACGPS:779] TAC32 Version 1.0.14 is available.

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Fri, 24 Oct 1997 10:39:53 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <01BCE071.222975C0.rick@cnssys.com>
Rendered body type: text/plain

All TAC32 testes,

This is the first new release since DCC. This version introduces a new
display interface for the satellite data. Satellite and receiver status
information is now displayed. Watch the SNR bars for satellite status
messages! Also displayed is DOP information. The NMEA mode has more DOP
and satellite-in-view information but the Mot Bin mode has lots of
interesting satellite status information (shown on the SNR bars).

There is a new Web page for downloading software (same address) at
http://www.cnssys.com/tac32

Everyone should go to the page, even Tom! All three types of download
methods previously described are supported directly from the page with
instructions. Tom can go directly to the bottom of the page for his
favorite method.

Now that I have completed cleaning up the existing code I will begin
working on the long-awaited missing features.

As always, I look forward to your comments and suggestions.

Rick
WB2TNL

85. [TACGPS:780] Re: What Should We See?

From: Robert Winingham <kc5ejk@onramp.net>
Date: Fri, 24 Oct 1997 18:53:37 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <v03102802b07686e06e9c@[206.50.201.69]>
Rendered body type: text/plain

Just run SIGPLOT a basic program that is part of the APRS files=20
on www.tapr.org in the full download of DOS APRS.

Makes it easy to monitor progress of a GPS lock and see how well
your antenna is working.

```
SUB Help (a$)
CLS : PRINT "SIGPLOT.bas Version 1.2  by  Bob Bruninga, WB4APR.  16 Jan 1997=
"
PRINT
PRINT "This APRS program monitors the NMEA $GPGSV sentence to extract AZ/EL=
 and Signal"
PRINT "data from satellites in view and then plot an Antenna pattern.  It=
 can monitor"
PRINT "TWO GPS units simultaneously so you can compare one antenna to a=
 reference.  "
PRINT
PRINT "Each second's data is plotted as it comes in, but you may press=
 either D for"
PRINT "Dots or L for a line plot.  After a few hours you should have enough=
 data for"
PRINT "a good Elevation plot since you are taking data from ALL azimuths. =
 But the"
PRINT "AZIMUTH plot takes 12 hours to get enough data for all the possible A=
zimuths"
PRINT "Since you are only taking data from 1/4 of the elevations for each pr=
ofile."
PRINT
PRINT "The AZIMUTH shows 4 colors, one for each elevation range.  This is=
 because the"
PRINT "Elevation plot is not equal at all elevations.  Also to make the plot=
 look"
PRINT "reasonable until enough data comes in, missing data are assumed to be=
 the"
PRINT "average value, so you will see perfect circles until the data fills i=
n."
PRINT
PRINT "REMEMBER THESE Three QUESTIONABLE ASSUMPTIONS:"
PRINT "  1) All satellites are transmitting equal output powers"
PRINT "  2) Your sky view is unobstructed in all directions."
PRINT "  3) For the ELEVATION plot, that your AZIMUTH pattern is OMNIdirecti=
onal"
PRINT "     Meaning a sat at 45=AF to East is averaged with all other 45=AF=
 sats, etc"
PRINT
```

The source code is short, ask Bob Bruninga wb4apr@amsat.org =20
to post if you can't find it.

73

Bob - Dallas,TX --- kc5ejk@onramp.net or kc5ejk@amsat.org --- =20

86. [TACGPS:782] Re:What Should We See?

From: Bob Johnson <wb4jcm@amsat.org>
Date: Sun, 26 Oct 1997 00:22:38 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <3.0.2.32.19971026011958.00691ff8@rio.atlantic.net>
Rendered body type: text/plain

>both units we get ASCII "sentences." Good--not totally dead. On one unit,
>after a while (after 1/2 to 1 hour) saw 8 satellites, but the time was off
>(by 20 minutes and some odd seconds), the "V" in the GPVTG record showed,
>the db fields for each satellite were null, and the lat/long fields were
>null with a "0," all indicating that it was not tracking. The other unit
>did not show any sats. After we had dinner we checked the records (3 hours
>elapsed time) and it was showing 6 sats, the correct time, but not lat/long
>nor indications of tracking. Here is a clip from the terminal program.
[...]

Mine (which arrived Friday) was also off by roughly 20 minutes. After watching it not get a fix for about 15 minutes, I sent it an initialization command to let it know the correct time and its current location. I went to bed and let it run overnight after that, and the next morning it had obtained a fix and was working just fine.

I suggest sending it a $PGRMI sentence with correct position and time information, e.g.

```
$PGRMI,2937.14,N,08223.95,W,261097,043530,A*  (use your own values, of course)
      |   lat   |   long   | date | time |
```

Just type in the sentence (it will keep on sending you sentences while you do this, so just ignore them and type carefully) and press "Enter". You should see the time change in the sentences it is producing. Then let it run for several hours so it gets a good opportunity to get current orbit info from the satellites (I've read a suggestion that you let it run at least twelve hours so it gets a chance to see all of the satellites, but I'm not sure that is really important).

I also think that the clip you posted suggests that you weren't really getting a good view of the sky. The $GPGSV sentences show that it thinks it knows where eight visible satellites are, but has only managed to actually lock on to two of them, both of them generally west of you. I suppose this could also be caused by a grossly wrong idea of where and when it is, but once it has acquired a few satellites I think it would get that straightened out pretty quickly.

If you are sure you are getting a good view of the sky, and initialization doesn't seem to help, I suppose it is possible that you are suffering from the bad antenna connection that Garmin mentioned (they said it showed up in cold weather). The fix was posted on the TAPR page with the original announcement of the GPS-30PC purchase, but it wasn't in the literature I got with mine. I would not be in a hurry to assume that is the problem, though.

It's probably important to note that when I started up my 30PC it did NOT have a good view of the sky, but was still able to get a fix after I initialized it to the correct time and place. Before I did that it was acting like yours.

Another approach, by the way, to getting an initial fix assumes that you car is parked somewhere with a better view of the sky than the window you are probably sticking it out of. Just forget about hooking it up to a computer, stick the thing on top of your car, plug it in, and let it run for a while (make sure there is actually power available from the lighter outlet in your car -- many don't have power when the car is not running). How long "a while" should be is a good question. Garmin's docs say that it should be able to get a fix from a cold start in under 15 minutes if it has a clear view of the sky. After you've left it there a while, plug it back into the computer and see if the time has changed to the correct time. If it has, the GPS is probably working ok.

I had a similar experience with an old Magellan Trailblazer (the original) that convinced itself a few weeks ago that it was at 24,000 feet altitude and then stopped getting fixes. It apparently couldn't reconcile what the satellites were telling it with where it thought it was. After leaving it under a clear sky for thirty minutes and still getting no fix, I re-initialized it with the correct altitude and location, and in a few minutes it had a good fix.

-- Bob
   WB4JCM

87. [TACGPS:783] Re:What Should We See?

From: Dave Martindale <davem@cs.ubc.ca>
Date: Sun, 26 Oct 1997 00:43:03 -0500 (CDT)

To: tacgps@tapr.org
Message-ID: <l03102001b07893fa1657@[198.162.38.159]>
Rendered body type: text/plain

In theory, about 30 minutes of uninterrupted view of most of the sky should be enough for a receiver like the 20/30 to find a few satellites, figure out where it is and what time it is, and then collect a complete new almanac. Once that's been done, it should get a fix in a few minutes the next time it is turned on, as long as the backup battery is OK, or you're supplying it with external backup power.

But the "uninterrupted" and "most of the sky" parts of that are important. The Garmin receivers seem to take much longer to acquire if anything occasionally blocks some satellite signals, or if the antenna is moving (I forgot to mention that - keep the antenna stationary). And, particularly when it is "lost", it needs to have a good look at the sky to have a reasonable chance of finding 4 satellites with good signals and geometry to get its first proper fix. Once it has got *that*, it knows which other satellites are visible and their approximate Doppler shifts and it can find others more easily.

But when it is in "search the sky" mode, it's trying all possible satellite numbers and Doppler offsets in the hope of finding *any* 4 satellites, and it needs all the help it can get.

Once it has a good almanac, its approximate location, and the approximate time, it can find satellites much more easily. This is why it only takes a few minutes for a fix next time it is turned on.

Dave

88. [TACGPS:784] Re: TAC32 Version 1.0.14 is available.

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Sun, 26 Oct 1997 01:15:10 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <3452EC77.2A1A@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Richard M. Hambly wrote:
>
> All TAC32 testes,
>
> This is the first new release since DCC. This version introduces a new
> display interface for the satellite data. Satellite and receiver status
> information is now displayed. Watch the SNR bars for satellite status
> messages! Also displayed is DOP information. The NMEA mode has more DOP
> and satellite-in-view information but the Mot Bin mode has lots of
> interesting satellite status information (shown on the SNR bars).

Rick -- since we just went from EDT to EST, there seems to be a small bug!
My W95 machine announced it had just changed the computer's time to EST. I kicked on TAC32 and it still showed EDT as the PC time. Killed the program and restarted it, ditto. Rebooted computer and ditto. It does seem to have changed to a 5 hour offset, but the name is wrong and it doesn't seem to re-read it.

Also, I note in MOT BIN that you only show PDOP, but in NMEA you show PDOP+HDOP+VDOP.

Tom

89. [TACGPS:785] Re: TAC32 Version 1.0.14 is available.

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Sun, 26 Oct 1997 01:29:27 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <3452F0CA.397C@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Rick -- The new status panel is interesting. Since you are reading the status info, there are a couple of other bits you might show that are in the Mot Binary format that tell what the DoD is doing to each satellite -- the AntiSpoofing (AS) status and the Selective Availability (SA) status. The former is reported explicitly as a bit, while the latter is implicit in the 5-bit (logarithimic) UERE (User Estimate of Range Error) value.

Tom

90. [TACGPS:786] Next steps in setting up Garmin GPS30

From: "Bittle, James F" <James.Bittle@MSRC.WPAFB.AF.MIL>
Date: Sun, 26 Oct 1997 11:04:59 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <ADCC38EE0118D011BFFB0000F801266302027E81@asent45.wpafb.af.mil>
Rendered body type: text/plain

Now that I have the case off, I find a soldered shield around the
circuit board. I assume the next step is to unsolder the shield to
remove the antenna and get at the MCX connector. Haven't seen any
discussion on this part yet. Suggestions welcome.
Thanks, Jim W8MYV

91. [TACGPS:787] Re: TAC32 Version 1.0.14 is available.

From: mdmiller@onramp.net
Date: Sun, 26 Oct 1997 12:00:05 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19971026115714.0095a740@199.1.11.3>
Rendered body type: text/plain

Richard M. Hambly wrote:
>
> All TAC32 testes,
>
> This is the first new release since DCC. This version introduces a new
> display interface for the satellite data. Satellite and receiver status
> information is now displayed. Watch the SNR bars for satellite status
> messages! Also displayed is DOP information. The NMEA mode has more DOP
> and satellite-in-view information but the Mot Bin mode has lots of
> interesting satellite status information (shown on the SNR bars).

I installed TAC32 verion 1.0.14 for the first time Saturday morning (10/25)
and have had a few problems. One problem Tom Clark has already documented
(daylight vs. standard time) so I won't go any farther with that. I have
erratic operation with TAC32 when I start the program. Most of the time
the clock window is frozen, closing then restarting TAC 32 until the
window updates is how I have been getting around this. I have had a
problem with the Eb/No bars on the satellites display. Infrequenly I will
be tracking a number of satellites, but the Eb/No display shows less than
the number I am tracking. The comupter I am running this program on is a
486DX2 50 with 12 Megs of ram.

Any comments?

Mark Miller
N5RFX

92. [TACGPS:788] TAC32 Version 1.0.15 is available.

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sun, 26 Oct 1997 12:57:48 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <01BCE215.FF5E6C20@rick.cnssys.com>
Rendered body type: multipart/mixed

[No readable text body. See the preserved original monthly archive.]
[Inline non-text content: multipart/mixed; 1,739 bytes]

93. [TACGPS:789] Re: Next steps in setting up Garmin GPS30

From: "Ronald G. Parsons" <w5rkn@amsat.org>
Date: Sun, 26 Oct 1997 15:52:00 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <3453B9F1.ADC9F8FC@amsat.org>
Rendered body type: text/plain

I'm collecting GPS 30 info for the TAPR archives. Could you briefly describe
how YOU got the case off. How much mutilation was necessary?

There is no MCX connector. Just an small shielded wire soldered onto the PCB.
You can get at the back of this connection without taking off the shield.

If you do take off the shield, describe how you did it. What are the chances
of putting an MMIC between the antenna and the GPS board?

Ron

Bittle, James F wrote:
>
> Now that I have the case off, I find a soldered shield around the
> circuit board. I assume the next step is to unsolder the shield to

> remove the antenna and get at the MCX connector. Haven't seen any
> discussion on this part yet. Suggestions welcome.
> Thanks, Jim W8MYV

--
Ron W5RKN

also:
rparsons@bga.com

94. [TACGPS:790] Re: TAC32 Version 1.0.14 is available.

From: "Richard M. Hambly" <rick@clark.net>
Date: Sun, 26 Oct 1997 17:05:21 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <01BCE238.C09D1FE0@rick.cnssys.com>
Rendered body type: multipart/mixed

[No readable text body. See the preserved original monthly archive.]
[Inline non-text content: multipart/mixed; 1,675 bytes]

95. [TACGPS:791] Re: TAC32 Version 1.0.14 is available.

From: mdmiller@onramp.net
Date: Sun, 26 Oct 1997 23:57:25 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19971026235115.0099b890@199.1.11.3>
Rendered body type: text/plain

Richard,
I checked the serial port setting after starting TAC32 and having the time
display frozen. I clicked ok and the program began to work correctly. I
then went back to edit serial port and clicked ok again and the time
display froze again. A third try made the program work again. I am using
an Oncore VP and the serial port setting is for MOT BIN. My receiver is
different in the fact that I have the carrier phase option. I have
enclosed the raw data capture file for you. The carrier phase option adds
data to the satellite range data output message @@Eg. That message is used
for post processing data.   I know that Tom mentioned at the DCC that RTCM
104 was a possible enhancement to TAC 32 or another program. It might be
interesting to save data from an Oncore in the RINEX format. Just a wish.
Thanks for the great program. When will version 1.0.15 be available?

Mark Miller N5RFX

Mark
At 05:05 PM 10/26/97 -0600, you wrote:
>Mark,
>
>What GPS receiver are you using?
>
>Try going to the menu item Edit/Set Serial Port and set the box below the
com port selector to your receiver type. This will force the correct
initialization.
>
>If that doesn't work then collect some data for me to look at. Go to the
menu item Data/View Raw Data. Let the window run for a minute or so to
collect some data then use the scroll bar to scroll back a little bit.
This will freeze the data in the window. Holding the left mouse button
down, wipe across a representative portion of the data, highlighting it.
Then click the right mouse button and select "Copy". You can now paste the
selection directly into your next e-mail. I need that data to see what is
going wrong.
>
>Rick
>WB2TNL
>
>
>-----Original Message-----
>From: mdmiller@onramp.net [SMTP:mdmiller@onramp.net]
>Sent: Sunday, October 26, 1997 1:00 PM
>To: tacgps@tapr.org
>Subject: [TACGPS:787] Re: TAC32 Version 1.0.14 is available.
>
>I installed TAC32 verion 1.0.14 for the first time Saturday morning (10/25)
>and have had a few problems. One problem Tom Clark has already documented
>(daylight vs. standard time) so I won't go any farther with that. I have
>erratic operation with TAC32 when I start the program. Most of the time
>the clock window is frozen, closing then restarting TAC 32 until the
>window updates is how I have been getting around this. I have had a
>problem with the Eb/No bars on the satellites display. Infrequenly I will

>be tracking a number of satellites, but the Eb/No display shows less than
>the number I am tracking. The comupter I am running this program on is a
>486DX2 50 with 12 Megs of ram.
>
>Any comments?
>
>Mark Miller
>N5RFX
>
>
>Attachment Converted: "c:\internet\eudora\attach\[TACGPS790] Re TAC32
Version "
>
[Attachment: N5RFX.txt; text/plain; 4,081 bytes]

96. [TACGPS:792] Re: HOW to get your new ONCORE in to NMEA

From: "Henk Uijterwaal (RIPE-NCC)" <henk@ripe.net>
Date: Mon, 27 Oct 1997 03:03:49 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <Pine.SUN.3.95.971027094840.29073B-101000@ncc.ripe.net>
Rendered body type: text/plain

On Sat, 25 Oct 1997, Doug McKinney wrote:

> Attached is an application note I wrote for Art Sepin of Synergy Systems
> (Motorola GPS sales).

> If you have other communications programs that do the samething, please
> email the procedures.

I do the same thing under UNIX (BSD/OS, FreeBSD) and wrote 3 tiny
programs for that:

* tac_format [-d] {NMEA|MPB}
      Switches the output format of the TAC from NMEA mode to MPB and
      back. The argument is the format that you want to switch to, no
      harm is done if the TAC is already in this format. -d is an
      optional debug flag, it prints the port settings.

* tac_mpb
      Sets up the TAC to send time/position data in MPB format every
      second, then prints the data coming from the TAC. This is an
      (extremely primitive) variation of SHOWTIME.

* tac_nmea
      Sets up the TAC to send NMEA strings every second, then prints the
      NMEA strings it sees.

The last 2 programs assume that the TAC is in MPB or NMEA format
respectively.

The programs run under BSD and FreeBSD, but should be fairly portable.
Things to look at first when debugging are the device name in tac.h and
the termios settings in tac_termios.c. The programs are attached to
this message as a gzip'ped tar file. Do:

```
   gzip -dc tac.tgz | tar xvf -
   cd tar
   make
```

to build them. Before using, please read our copyright notice.

Henk

Henk Uijterwaal   Email: henk.uijterwaal@ripe.net
RIPE Network Coordination Centre   WWW: http://www.ripe.net/home/henk
Singel 258   Phone: +31.20.5354414
1016 AB Amsterdam   Fax: +31.20.5354445
The Netherlands   Home: +31.20.6651962

%DCL-E-NOCFFE, unable to locate coffee - keyboard input suspended.
[Attachment: tac.tgz; application/octet-stream; 7,664 bytes]

97. [TACGPS:793] TAC32 display problems

From: mdmiller@onramp.net
Date: Mon, 27 Oct 1997 06:57:31 -0600 (CST)

To: tacgps@tapr.org
Message-ID: <3.0.3.32.19971027065338.0099e1b0@199.1.11.3>
Rendered body type: text/plain

Richard,

The two attached files are data captures during the time I have had problems with the TAC32 display. It looks like an init problem.

BrokeTac.txt is during the time when the display is frozen, but the Eb/No bars seem to be working properly.
BrokeTac1.txt is during the time when the time display is ok, but the Eb/No bars show data for only 5 SV's when I am tracking 7 SV's

73
Mark Miller
N5RFX
[Attachment: BrokeTac.txt; text/plain; 1,247 bytes]
[Attachment: BrokeTac1.txt; text/plain; 2,886 bytes]

98. [TACGPS:794] Carrier phase

From: "Michael R. Owen" <nlsa@northnet.org>
Date: Mon, 27 Oct 1997 08:05:29 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <34549DAE.D561221A@northnet.org>
Rendered body type: text/plain

Friends,

I am interested in using GPS carrier phase interferometry to compute attitude (like will be done on P3D). Can someone on the net point me to the algorithm that is used in this calculation, or perhaps to someone who is working on the topic?

MRO
(W9IP)
--
Michael R. Owen, Ph.D. Dept. of Geology
Northern Lights Software Associates St. Lawrence University
nlsa@nlsa.com mowe@slumus.stlawu.edu

99. [TACGPS:795] RE: TAC32 display problems

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Mon, 27 Oct 1997 18:31:18 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <01BCE30E.67DFD1A0@rick.cnssys.com>
Rendered body type: multipart/mixed

[No readable text body. See the preserved original monthly archive.]
[Inline non-text content: multipart/mixed; 6,063 bytes]

100. [TACGPS:796] GPS attitude

From: "James L. Johnson" <jjjohnson@saiph.hpl.hp.com>
Date: Tue, 28 Oct 1997 11:38:14 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199710281731.JAA12579@saiph.hpl.hp.com>
Rendered body type: text/plain

Hello Dr. Owen,

My colleague happened to have an article handy that describes your topic. It is titled: "Mathematics of Attitude Determination with GPS", by Alfred Kleusberg, University of New Brunswick. There are also about half-a-dozen references for further reading included. The article appeared in the September, 1995 GPS World magazine.

If this would help, I'll send (or FAX) it to you.

73,

Jim W6SC
jjohnson@hpl.hp.com
HP Laboratories
Palo Alto, CA

101. [TACGPS:797] Garmin OEM Documentation

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Wed, 29 Oct 1997 11:31:42 -0600 (CST)

To: tacgps@tapr.org
Message-ID: <34577259.6390@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Several people have asked for copies of Garmin's technical documentation
on their OEM receivers (the most recent being Eric, W3DQ who couldn't
get his TAPR $99 GPS30 to lock up).

At the TAPR/AMSAT DCC a couple of weeks ago, the Garmin folks were
handing out floppies with .pdf files containing documentation on
all the flavors of -20, -25, -30, -35 and -36 rcvrs. Since I know
some of you were not at the DCC, I have posted the .pdf files on
my aleph file server at URL

   ftp://aleph.gsfc.nasa.gov/GPS/garmin/

These files contain the pinouts for the connectors on each rcvr, the
NMEA in/out strings (including the mysterious $PGRMC command you need
to use to initialize a revr's position/mode), electrical & mechanical
specs, etcetera.

Read & Enjoy -- 73, Tom

102. [TACGPS:798] Re: Garmin OEM Documentation

From: "Ronald G. Parsons" <w5rkn@amsat.org>
Date: Wed, 29 Oct 1997 12:48:32 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <345783BA.3F0F31A8@amsat.org>
Rendered body type: text/plain

Do you (or anyone) have the tech doc for the GPS 30PC that TAPR is selling.
It's not the same as the gps30.pdf

Ron

Dr Thomas A Clark (W3IWI) wrote:
>
> Several people have asked for copies of Garmin's technical documentation
> on their OEM receivers (the most recent being Eric, W3DQ who couldn't
> get his TAPR $99 GPS30 to lock up).
>
> At the TAPR/AMSAT DCC a couple of weeks ago, the Garmin folks were
> handing out floppies with .pdf files containing documentation on
> all the flavors of -20, -25, -30, -35 and -36 rcvrs. Since I know
> some of you were not at the DCC, I have posted the .pdf files on
> my aleph file server at URL
>
>   ftp://aleph.gsfc.nasa.gov/GPS/garmin/
>
> These files contain the pinouts for the connectors on each rcvr, the
> NMEA in/out strings (including the mysterious $PGRMC command you need
> to use to initialize a revr's position/mode), electrical & mechanical
> specs, etcetera.
>
> Read & Enjoy -- 73, Tom

--
Ron W5RKN

also:
rparsons@bga.com

103. [TACGPS:799] Re: Garmin OEM Documentation

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Wed, 29 Oct 1997 13:34:11 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <v0311070ab07d35b9e9a8@[208.134.134.40]>
Rendered body type: text/plain

Hi Tom.

I guess I forgot to post something on the list after I put the files up
last week.

Opps -- they are also on ftp://ftp.tapr.org/tapr/gps/garmin/

Cheers - Greg

>Several people have asked for copies of Garmin's technical documentation

>on their OEM receivers (the most recent being Eric, W3DQ who couldn't
>get his TAPR $99 GPS30 to lock up).
>
>At the TAPR/AMSAT DCC a couple of weeks ago, the Garmin folks were
>handing out floppies with .pdf files containing documentation on
>all the flavors of -20, -25, -30, -35 and -36 rcvrs. Since I know
>some of you were not at the DCC, I have posted the .pdf files on
>my aleph file server at URL
>
>   ftp://aleph.gsfc.nasa.gov/GPS/garmin/
>
>These files contain the pinouts for the connectors on each rcvr, the
>NMEA in/out strings (including the mysterious $PGRMC command you need
>to use to initialize a revr's position/mode), electrical & mechanical
>specs, etcetera.
>
>Read & Enjoy -- 73, Tom

Greg Jones, WD5IVD
Austin, Texas
wd5ivd@tapr.org
http://www.tapr.org/~wd5ivd

104. [TACGPS:800] TAC32 and Motorola firmware update

From: Kohjin Yamada <kohjin@cosmos.marina.prug.or.jp>
Date: Thu, 30 Oct 1997 00:22:44 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199710300538.OAA01237@cosmos.marina.prug.or.jp>
Rendered body type: text/plain

Hello all,

I've just finished TAC-2, thanks!
There were lot of troubles running SHOWTIME in Win95 exiting to DOS in "Device
I/O error in line 1 of module SHWTM33D at address 13AA:0AE6".
The Tom's suggestion of FIFO disable doesn't help and tried changing some
parameters in showtime.gps, Pcrate 4 helps a bit but not definitely.
Are there anyone successes in Win95?

Thanks to Rick for TAC32 v1.0.15 It works great!
Have one wish_list here;
        option to change local TIMEZONE in "PC Time".
        It shows PST only.
Keep nice job Rick, we are patient enough waiting for the enhanced version.

By the way, my gps receiver is Motorola ONCORE BASIC (PVT-6).
Software version 5.0, 20 Jan 1994, Option AB.
I have ever heard the firmware could be updated by somehow contacting
Motorola.
I really wish to have 8 channel capability.
Does anyone know of how to get updated in more detail?

Thanks again to Tom and all who have developed such a great machine!

73 Kohjin, JR1EDE

PS: I knew this mailing list available open yesterday and subscribed.
    I have July to Sept archives and have read all several times
    but I'm afraid I missed something since Sept.

105. [TACGPS:801] Re: TAC32 and Motorola firmware update

From: "James L. Johnson" <jjjohnson@saiph.hpl.hp.com>
Date: Thu, 30 Oct 1997 11:57:49 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199710301716.JAA13433@saiph.hpl.hp.com>
Rendered body type: text/plain

>
> Hello all,
>
> I've just finished TAC-2, thanks!
> There were lot of troubles running SHOWTIME in Win95 exiting to DOS in "Device
> I/O error in line 1 of module SHWTM33D at address 13AA:0AE6".
> The Tom's suggestion of FIFO disable doesn't help and tried changing some
> parameters in showtime.gps, Pcrate 4 helps a bit but not definitely.
> Are there anyone successes in Win95?

  Yes, I was able to run it successfully under Win95. It ran flawlessly
for several days, then crashed for some unknown reason. Re-starting it
brought it up immediately with no further problems.

  I am also running an old PVT-6 and I believe I have the same version
of software that you have. Mine is shut down now, awaiting installation
at home, so I don't have the unit or any of the data here at work.

  Good luck in troubleshooting your pc problem!

  73,

  Jim W6SC
  Work: jjohnson@hpl.hp.com
  Home: jjoker@dxhound.com

106. [TACGPS:802] Re: TAC32 and Motorola firmware update

From: Kohjin Yamada <kohjin@cosmos.marina.prug.or.jp>
Date: Thu, 30 Oct 1997 13:17:05 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199710301906.EAA02439@cosmos.marina.prug.or.jp>
Rendered body type: text/plain

Hello Jim,

At 11:57 97/10/30 -0600, you wrote:
> >
> > Hello all,
> >
> > I've just finished TAC-2, thanks!
> > There were lot of troubles running SHOWTIME in Win95 exiting to DOS in
"Device
> > I/O error in line 1 of module SHWTM33D at address 13AA:0AE6".
> > The Tom's suggestion of FIFO disable doesn't help and tried changing some
> > parameters in showtime.gps, Pcrate 4 helps a bit but not definitely.
> > Are there anyone successes in Win95?
>
>   Yes, I was able to run it successfully under Win95. It ran flawlessly
> for several days, then crashed for some unknown reason. Re-starting it
> brought it up immediately with no further problems.

flawlessly for several days!
Mine runs for about up to, say several minutes ;-<
Do you run it by going to MS-DOS prompt or directly from explorer?

>
>   I am also running an old PVT-6 and I believe I have the same version
> of software that you have. Mine is shut down now, awaiting installation
> at home, so I don't have the unit or any of the data here at work.

So, what is your present receiver, is it Motorola VP?

>
>   Good luck in troubleshooting your pc problem!
>
>   73,
>
>   Jim W6SC
>   Work: jjohnson@hpl.hp.com
>   Home: jjoker@dxhound.com
>
>
>

Thanks for the reply.
73 Kohjin, JR1EDE

107. [TACGPS:803] Re: TAC32 and Motorola firmware update

From: "James L. Johnson" <jjjohnson@saiph.hpl.hp.com>
Date: Fri, 31 Oct 1997 10:52:11 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199710311650.IAA21831@saiph.hpl.hp.com>
Rendered body type: text/plain

> >   Yes, I was able to run it successfully under Win95. It ran flawlessly
> > for several days, then crashed for some unknown reason. Re-starting it
> > brought it up immediately with no further problems.
>
> flawlessly for several days!

> Mine runs for about up to, say several minutes ;-<
> Do you run it by going to MS-DOS prompt or directly from explorer?

  I wish I still had it up and running so I could try these things
out, but I recall running it from the DOS prompt.

>
> >
> >   I am also running an old PVT-6 and I believe I have the same version
> > of software that you have. Mine is shut down now, awaiting installation
> > at home, so I don't have the unit or any of the data here at work.
>
> So, what is your present receiver, is it Motorola VP?

  Present receiver is still the PVT-6 (the price was right!) and it
seems to work just fine, although it uses old software. So I'm going
to stay with it.

  73,

  Jim

108. [TACGPS:804] TAC-2 and GPS30PC

From: Randolph Bentson <bentson@grieg.holmsjoen.com>
Date: Fri, 31 Oct 1997 12:35:51 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199710311830.KAA20353@grieg.holmsjoen.com>
Rendered body type: text/plain

I've got the card assembled, but I've hesitated to dig into
the GPS 30PC I bought through TAPR. My concern was that I
couldn't find documentation on the 12 pin connector. The
"GPS30PC Notes" has the phrase "I assume there is regulation
via this pin" -- I didn't find much reassurance in this.

I just got off the phone with Brad Weisman at Garmin and feel
ready to tackle the job. He said the GPS20SL inside has been
changed only by the addition of a voltage regulator and the
substitution of a built-in antenna for the MX connector.

Brad confirmed that the switching regulator is fed via pin 9.
He further noted that you can still provide VCC via pin 10,
but at the cost of a slight additional current drain into the
regulator's sensors.

Lucky me--I don't have to touch the metal case--I
only have to find inserts for the 12 pin connector.

Since I haven't seen this specific information in the list's
archives (will there be an October file?), I thought it a
good idea to pass this on to the group.

Randolph Bentson
bentson@grieg.seaslug.org

109. [TACGPS:805] Re: TAC-2 and GPS30PC

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Fri, 31 Oct 1997 14:03:05 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <v03110707b07fe5cd1bc3@[208.134.134.40]>
Rendered body type: text/plain

>I've got the card assembled, but I've hesitated to dig into
>the GPS 30PC I bought through TAPR. My concern was that I
>couldn't find documentation on the 12 pin connector. The
>"GPS30PC Notes" has the phrase "I assume there is regulation
>via this pin" -- I didn't find much reassurance in this.

The GPS30PC is a GPS20. The pinout is the same as the GPS20, which I
thought we were including with the kit. Did you not get a copy ? The
GPS20 Doc is on the TAPR web site under the GPS20.

>I just got off the phone with Brad Weisman at Garmin and feel
>ready to tackle the job. He said the GPS20SL inside has been
>changed only by the addition of a voltage regulator and the
>substitution of a built-in antenna for the MX connector.

**** PLEASE PLEASE PLEASE*****
Don't anyone else call Brad Wiseman.

One of the reasons we do this group thing is becuase we promised not to
bother Brad. If Garmin and Brad get overwhelmed with calls then we
probably don't see much potential for further work with Gramin on their end.

>Since I haven't seen this specific information in the list's
>archives (will there be an October file?), I thought it a
>good idea to pass this on to the group.

Glad you got this worked out -- but everyone else needs to you the list here.

As to the archives -- I am having to do those by hand for now. The TAPR
listserv is not doing the TACGPS list and we don't expect to work on this
issue until we get new software working.

Cheers - Greg

Greg Jones, WD5IVD
Austin, Texas
wd5ivd@tapr.org
http://www.tapr.org/~wd5ivd

110. [TACGPS:806] RE: TAC32 and Motorola firmware update

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Fri, 31 Oct 1997 16:10:10 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <01BCE61E.A84A9A00@rick.cnssys.com>
Rendered body type: multipart/mixed

[No readable text body. See the preserved original monthly archive.]
[Inline non-text content: multipart/mixed; 1,882 bytes]

111. [TACGPS:807] Help Needed w/GPS30PC

From: "Rosenberg.Eric"<rosenberg.eric@orbcomm.com>
Date: Fri, 31 Oct 1997 16:36:59 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <9710318783.AA878319312@occgate.orbcomm.com>
Rendered body type: text/plain

I'm on travel in Geneva (HB9) with a bum GPS30PC. I can't get a decent
     fix, and need to do a reset.

     I don't know how...

     If *you* do -- please send me the details! I have the usual Win95
     terminal programs (Hyperterminal, Procomm Plus95), along with SA
     Watch. No Showtime or anything similar.

     Thanks in advance!

     Eric W3DQ
     rosenberg.eric@orbcomm.com

112. [TACGPS:808] Re: TAC-2 and GPS30PC

From: Dave Martindale <davem@cs.ubc.ca>
Date: Fri, 31 Oct 1997 17:41:44 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <l03102001b08025eab77d@[198.162.38.159]>
Rendered body type: text/plain

>Lucky me--I don't have to touch the metal case--I
>only have to find inserts for the 12 pin connector.

Garmin sells the connector including a full set of wire leads for
something like $10. The GPS 20 manual also tells you where you
can buy a raw connector.

        Dave

113. [TACGPS:809] Re: TAC-2 and GPS30PC

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Fri, 31 Oct 1997 18:01:45 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <v0311070fb0801fcfbea9@[208.134.134.40]>
Rendered body type: text/plain

The $10 is in qty of 100 I believe. TAPR is now shipping these with the
GPS-20 units and future GPS-25 in the next few weeks once I get the page
changed over.

You can get these from TAPR -- I think we going to do them at $12 each.

Garmin is out of stock of these for another 2-3 weeks.

Cheers - Greg

>>Lucky me--I don't have to touch the metal case--I
>>only have to find inserts for the 12 pin connector.
>
>Garmin sells the connector including a full set of wire leads for
>something like $10. The GPS 20 manual also tells you where you
>can buy a raw connector.
>
>   Dave

Greg Jones, WD5IVD
Austin, Texas
wd5ivd@tapr.org
http://www.tapr.org/~wd5ivd

114. Re: [TACGPS:805] Re: TAC-2 and GPS30PC

From: Randolph Bentson <bentson@grieg.holmsjoen.com>
Date: Fri, 31 Oct 1997 21:10:30 -0800
To: wd5ivd@tapr.org
Message-ID: <199711010510.VAA22815@grieg.holmsjoen.com>
Rendered body type: text/plain

> The GPS30PC is a GPS20. The pinout is the same as the GPS20, which
> I thought we were including with the kit. Did you not get a copy ?
> The GPS20 Doc is on the TAPR web site under the GPS20.

Actually, Brad said it's based on a GPS20SL, but the pinout is
not the same. The included documentation on the GPS20 (and
all related documentation on similar Garmin products) was quite
clear that pin 9 was NC and that pin 10 needed a clean 5VDC.
It's that discrepancy which prompted my call to Garmin.

None of the documentation from TAPR identified the exact model
inside and none of the documentation clearly stated the GPS30PC
has a switching power supply added to pin 9 of the connector.
Had I known this, no call would have been needed.

> **** PLEASE PLEASE PLEASE*****
> Don't anyone else call Brad Wiseman.

In this I agree, but this only makes sense if these details
can be clearly distributed to GPS30PC users.

Actually Brad seemed enthusiastic about distributing better
technical information about products via the Internet. He
was quite critical of Garmin management's slow movement in
this respect and he was pleased that TAPR took the info he
passed via disks and put it online. (For that matter, he's
upset that the "OEM" web page has said "under construction"
since he joined that group a year ago.) We also discussed
the utility of a published specification for the Garmin
protocol, but he couldn't offer much help.

> Glad you got this worked out --
> but everyone else needs to you the list here.

This last part doesn't parse, but I hope you intended "needs
you to post to the list here" or some such. Before I called
Garmin, I reviewed the July, August and September archives.
You might want to push for a note on the web page which more
clearly describes how the GPS30PC is constructed and how it
is to be used.

I've replied to you directly rather than posting to the list.
I'll leave it to you to include any part in any note you post

to the list.

Randolph Bentson
bentson@grieg.seaslug.org

November 1997

Original source file: tacgps.9711
Source: http://ftp.tapr.org/product_docs/TAC2/mail_archives/tacgps.9711

1. [TACGPS:810] TAC32 Version 1.0.16 is available

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sun, 2 Nov 1997 19:59:50 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <01BCE7D1.0ADD7D00@rick.cnssys.com>
Rendered body type: multipart/mixed

[No readable text body. See the preserved original monthly archive.]
[Inline non-text content: multipart/mixed; 1,266 bytes]

---

2. [TACGPS:811] DOS Display program for GPS-30

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Sun, 2 Nov 1997 21:06:39 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199711030258.VAA18598@aus-e.mp.campus.mci.net>
Rendered body type: text/plain

Is there a DOS program around that will pick off the data from the GPS-30
(*without* the TAC board) and display the lat/long, etc.?

A terminal program of course displays the raw "sentences" but it would be
handy to have it displayed in fixed position screen format. I looked on the
TAPR FTP, but didn't find one. It wouldn't take much effort to cobble up a
program (but it takes even less to download one & I expect there are many
that do this).

73's
Don, W4DH

---

3. [TACGPS:812] RE: TAC32 and Motorola firmware update

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sun, 2 Nov 1997 22:23:35 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <01BCE7E5.990FAE40@rick.cnssys.com>
Rendered body type: multipart/mixed

[No readable text body. See the preserved original monthly archive.]
[Inline non-text content: multipart/mixed; 2,216 bytes]

---

4. [TACGPS:814] Re: TAC32 Version 1.0.16 is available

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Mon, 3 Nov 1997 12:49:42 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <345E1AD2.2EF8@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Richard M. Hambly wrote:
>
> All TAC32 testers,
>
> Here is another release of the TAC32 software. There are quite a few changes that you should find
interesting. I am working my way up to the point where every feature from Showtime is reflected in
TAC32 so I can get to work on additional features that are not in Showtime. This release gets me
another step of the way to that goal.
>
> Complete information and downloading directions are on the TAC32 Web page at
http://www.cnssys.com/tac32/
>
> As always, I look forward to your comments and suggestions.
>
> Rick
> WB2TNL

Since Rick's cnsys.com host has a fairly slow internet connection, I
have mirrored his files (but not the "Install from Web") at

  ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/tac32/

The current files on aleph have a date/time stamp Nov.3 @ approx 13:30
and correspond to Rick's files of Nov.3 @ 01:45

73, Tom

---

5. [TACGPS:816] [MIC-E:1401] TAPR/Garmen GPS-30.

From: wb5kcm@juno.com (by way of Greg Jones, WD5IVD)
Date: Mon, 3 Nov 1997 20:43:54 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <v0311071eb0843bc3a469@[206.138.226.141]>
Rendered body type: text/plain

I recently obtained one of the Garmen GPS-30 units from TPRS. It did not work in the original configuration. It was not receiving the satellites. I was watching the NMEA data from the DB9 connector using a nmea reader program and small interface unit. The plastic case was removed exposing the GPS-30PC engine and antenna. Removed the antenna connection from the GPS-30 engine and checked for the 5 volt supply for an active antenna. There was no 5 volts. Opened the metal cover near the antenna connection, this is where the RF components are enclosed. Traced along the PC Board from the center pin back and noticed a small solder pad near where the antenna line terminates. Found the 5 volts on this pad. Jumpered this over to the antenna side solder pad using a very small wire. Possibly the factory did not connect this wire in some of the units. Now reconnected the antenna and the GPS-30 immediately started receiving satellites and took a good fix. Replaced the metal cover on the RF box. If anyone else has purchased one of these units and its not working, may want to try this fix. DO THIS AT YOUR OWN RISK!...good luck...

Randy Perkins (WB5KCM)
wb5kcm@juno.com

---

6. [TACGPS:817] RE: TAC32 and Motorola firmware update

From: Kohjin Yamada <kohjin@cosmos.marina.prug.or.jp>
Date: Mon, 3 Nov 1997 21:20:11 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199711040240.LAA11848@cosmos.marina.prug.or.jp>
Rendered body type: text/plain

Hi Rick,

I'm running Windows 95 Japanese version.
I'm sure it uses Japanese *fonts* for many applications including Date/Time.
This must be same as many others like Germany, France, Asia etc using
not ascii.
So I think I can agree with you 'sending the wrong string' to TAC32.
If these are found true, why don't you go for edit feature for local timezone.

73 and thanks for version 1.0.16
Kohjin, JR1EDE

At 22:23 97/11/02 -0600, you wrote:
> Kohjin,
>
> I looked into your problem again. Are you running Windows NT or Windows 95.
I found that for Windows NT you must make the change from the Administrator's
account even if the user has the privilege which allows him to set the system
clock. Also, the change must be made from the Control Panel's Date/Time program
or from the system clock in the lowe right corner of the screen, not from the
"Regional Settings" program.
>
> When I changed to UTC+9 and restarted TAC32 the time zone reported "Tokyo
Standard Time" I noticed that TAC32 had to be restarted. That may be a bug,
I'll have to check. In any case, the string describing the time zone is
retrieved directly from the operating system. I do not keep the strings in
TAC32. I doubt that the Japanese version would return the wrong string.
>
> Rick
> WB2TNL
>
> -----Original Message-----
> From: Kohjin Yamada [SMTP:kohjin@cosmos.marina.prug.or.jp]
> Sent: Friday, October 31, 1997 11:46 PM
> To: rick@cnssys.com
> Subject: Re: [TACGPS:806] RE: TAC32 and Motorola firmware update
>
> Hi Rick,
>
> Thanks for your response.
>
> I'm going to send this direct to you because I can't read the attached file
> at the end. I have tried all available programs but it were all failed.
> Seems you are you are using Microsoft mail, aren't you, mine is Eudora.
> Sorry but could you please send it again in an other file type?

> Before I send my comment to the tacgps mailing list, here's for you;
>
> At 16:10 97/10/31 -0600, you wrote:
> > Kohjin,
> >
> > Sorry for the delay. I've been out of town on business.
> >
> > TAC32 gets the time zone setting from the operating system. All Windows
> products ship with PST because that's where Microsoft is located. For Win95
> open the Control panel and double click on Date/Time or just double click on
> the little clock in the lower right of your screen on the status bar.
Select
> the Time Zone tab and set the time zone to whatever you like. TAC32 will
follow
> these instructions, including daylight savings time offsets.
>
> It's only selectable from (GMT+09:00) for my QTH.
> Our Japanese version of Win95 seems to be different!
> No i.e; JST PST EST etc etc :-<
> So it's definitely true we need that option for all over the world!
>
> 73 & thanks, Kohjin JR1EDE

7. [TACGPS:818] Re: [MIC-E:1401] TAPR/Garmen GPS-30.

From: Ray Grace <wa6owm@deltanet.com>
Date: Tue, 4 Nov 1997 01:13:45 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <345EC74D.7FD27CE4@deltanet.com>
Rendered body type: text/plain

I guess I was lucky, mine worked right out of the box. RX performance was
poor in the Radio Shack, so I did mount the unit outdoors at about 20 feet.
Now I can copy 7 to 8 satellites with SNR of 20-40dB. I have tested the unit
using Street Atlas 5.0 and WAPRS205. Works great.
Good luck with your repaired unit
Ray - WA6OWM
wa6owm@deltanet.com

=====

by way of Greg Jones, WD5IVD wrote:

> I recently obtained one of the Garmen GPS-30 units from TPRS. It did not
> work in the original configuration. It was not receiving the satellites.
> I was watching the NMEA data from the DB9 connector using a nmea reader
> program and small interface unit. The plastic case was removed exposing
> the GPS-30PC engine and antenna. Removed the antenna connection from the
> GPS-30 engine and checked for the 5 volt supply for an active antenna.
> There was no 5 volts. Opened the metal cover near the antenna connection,
> this is where the RF components are enclosed. Traced along the PC Board
> from the center pin back and noticed a small solder pad near where the
> antenna line terminates. Found the 5 volts on this pad. Jumpered this
> over to the antenna side solder pad using a very small wire. Possibly the
> factory did not connect this wire in some of the units. Now reconnected
> the antenna and the GPS-30 immediately started receiving satellites and
> took a good fix. Replaced the metal cover on the RF box. If anyone else
> has purchased one of these units and its not working, may want to try
> this fix. DO THIS AT YOUR OWN RISK!...good luck...
>
> Randy Perkins (WB5KCM)
> wb5kcm@juno.com

8. [TACGPS:819] Re: [MIC-E:1401] TAPR/Garmen GPS-30.

From: "James L. Johnson" <jjjohnson@saiph.hpl.hp.com>
Date: Tue, 4 Nov 1997 12:44:00 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199711041842.KAA14966@saiph.hpl.hp.com>
Rendered body type: text/plain

> antenna line terminates. Found the 5 volts on this pad. Jumpered this
> over to the antenna side solder pad using a very small wire. Possibly the
> factory did not connect this wire in some of the units. Now reconnected
> the antenna and the GPS-30 immediately started receiving satellites and
> took a good fix. Replaced the metal cover on the RF box. If anyone else
> has purchased one of these units and its not working, may want to try
> this fix. DO THIS AT YOUR OWN RISK!...good luck...
>
> Randy Perkins (WB5KCM)
> wb5kcm@juno.com

>
>
>
Randy,

   Sounds like they didn't test this one before they shipped it out
the door. Maybe they only sample-test ... maybe they don't final test
at all. Risky business. Thanks for passing it on to others who may
suffer the same problem or other problems that might have been caught
by adequate testing.

  Jim W6SC
  jjohnson@hpl.hp.com

9. [TACGPS:820] Re: [MIC-E:1401] TAPR/Garmen GPS-30.

From: clark@tomcat.gsfc.nasa.gov (Tom Clark -- W3IWI)
Date: Tue, 4 Nov 1997 13:19:27 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <42639@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Here is my gut feelining: The GPS30 has an internal non-amplified patch
antenna. They may have omitted the antenna bias jumper because it isn't
needed unless you use an external amplified antenna. Your finding that
the jumper is needed is a useful contribution!

You might want to make the jumper be a real RF Choke. Here is a hint --
take a pre-stripped 1" long piece of #30 wire-wrap wire (this makes the
total length be ~3"). Wind the insulated portion of the wire on a small
nail or drill-bit (like ~1/16" diameter) to make a coil. Then use this
instead of a simple jumper wire. I've used such simple home-made RF chokes
a lot of times for L/S-band applications.

73, Tom

10. [TACGPS:821] GPS30PC Simple Test & Preliminary Results

From: Pat Kilroy <pat.kilroy@gsfc.nasa.gov>
Date: Wed, 5 Nov 1997 13:04:52 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19971105140055.008a0bd0@pop700.gsfc.nasa.gov>
Rendered body type: text/plain

I connected my GPS30PC to a MIM module (obtained from
http://www.agrelo.com/clement.html) and connected the MIM
to a low-output transmitter. I saw no output from the
little packet system on the system in my shack. In fact,
the GPS30PC froze all MIM operations. Unplugging the GPS
unit brought the MIM back to life, sans GPS telemetry.
Substituting a GPS-45XL receiver, all worked dandy
together.

The next day I again set up on the picnic table in my
backyard with a beautiful view of the Maryland sky. I
connected the GPS30PC directly to a laptop PC and
received kilobytes of NMEA 0183 sentences saved to disk
using a simple terminal program. Appeared to be nominal
operation. Example excerpt:

$GPRMC,131922,A,3855.5527,N,07644.1954,W,0.0,000.0,301097,010.5,W*72
$GPGGA,131922,3855.5527,N,07644.1954,W,1,06,1.3,77.4,M,-34.1,M,,*47
$GPGSA,A,3,06,10,17,23,24,26,,,,,,,2.3,1.3,2.0*31
$GPGSV,2,1,07,06,51,241,44,10,34,060,44,17,38,312,44,23,21,264,41*72
$GPGSV,2,2,07,24,20,119,41,26,69,163,47,27,14,057,,,,,*48
$PGRME,59.1,M,92.8,M,110.0,M*20
$GPVTG,000.0,T,010.5,M,00.0,N,00.0,K*4A
$GPRMC,131923,A,3855.5526,N,07644.1954,W,0.0,000.0,301097,010.5,W*72
$GPGGA,131923,3855.5526,N,07644.1954,W,1,06,1.3,77.3,M,-34.1,M,,*40
$GPGSA,A,3,06,10,17,23,24,26,,,,,,,2.3,1.3,2.0*31
$GPGSV,2,1,07,06,51,241,44,10,34,060,44,17,38,312,44,23,21,264,41*72
$GPGSV,2,2,07,24,20,119,41,26,69,163,47,27,14,057,,,,,*48
$PGRME,59.1,M,92.8,M,110.0,M*20
$GPVTG,000.0,T,010.5,M,00.0,N,00.0,K*4A
$GPRMC,131924,A,3855.5527,N,07644.1948,W,0.0,000.0,301097,010.5,W*79
$GPGGA,131924,3855.5527,N,07644.1948,W,1,06,1.3,77.7,M,-34.1,M,,*4F
$GPGSA,A,3,06,10,17,23,24,26,,,,,,,2.3,1.3,2.0*31
$GPGSV,2,1,07,06,51,241,44,10,34,060,44,17,38,312,44,23,21,264,41*72
$GPGSV,2,2,07,24,20,119,41,26,69,163,47,27,14,057,,,,,*48
$PGRME,59.1,M,92.8,M,110.0,M*20
$GPVTG,000.0,T,010.5,M,00.0,N,00.0,K*4A

I disconnected the GPS30PC power for about 30 seconds. I was
pleased to see that, after reconnection, it took less than
25 seconds to churn out meaningful data again.

Well, that was a few days ago and now it's time to go back
and check further to see why the GPS30PC won't talk to the
MIM module.

Any comments and suggestions accepted. More later.

73, Pat WD8LAQ

11. [TACGPS:823] Re: Archive of TACGPS-list messages?

From: Randolph Bentson <bentson@grieg.holmsjoen.com>
Date: Thu, 6 Nov 1997 09:47:04 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199711061543.HAA26772@grieg.holmsjoen.com>
Rendered body type: text/plain

There are lists for July, Aug & Sep in
    ftp://ftp.tapr.org/tapr/tac2/mail_archives/
I'm told the Oct list will appear soon, but it
depends on a manual process. I don't know if
there is/will be a current month list.

Randolph Bentson
bentson@grieg.seaslug.org
http://www.ssc.com/ssc/insidelinux

12. [TACGPS:824] [Fwd: TAC2]

From: "Ronald G. Parsons" <w5rkn@amsat.org>
Date: Fri, 7 Nov 1997 11:36:28 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <34634F60.61BACD7B@amsat.org>
Rendered body type: text/plain

Can someone help this person.

Ron

Josi Carlos de Andrade wrote:
>
> Dear Ron,
>
> I am mounting the KIT TAC2 as Dr. Trivedi had said yours.
> First, thanks for your prompt answer. Well, I did mount all parts of kit
> and i did all tests in hardware as explained in manual. Ok it's working
> very well but when I connect it in a computer and run the software
> SHOWTIME.bat included with the kit, happens the follow:
> 1. The software can't find the signal DCD (1PPS)
> 2. The software can't establish communications with the unit in any of
> RS232 ports or speeds.
>
> I'm using an antenna with 40 cm of length and BNC connector without
> polarization.
>
> Looking to a scope , I see a permanent signal (words) coming out in TX
> of port RS232 (#1 or #2).
>
> For any answer please use my correct e-mail address:
> andrade@yabae.cptec.inpe.br or andrade@coma.cptec.inpe.br
>
> JCA

--
Ron W5RKN

also:
rparsons@bga.com

13. [TACGPS:825] Re: [Fwd: TAC2]

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Fri, 7 Nov 1997 12:32:29 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <34635E16.3DBA@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Ronald G. Parsons wrote:
>
> Can someone help this person.
>
> Ron
>
> Josi Carlos de Andrade wrote:
> >
> > Dear Ron,
> >
> > I am mounting the KIT TAC2 as Dr. Trivedi had said yours.
> > First, thanks for your prompt answer. Well, I did mount all parts of kit
> > and i did all tests in hardware as explained in manual. Ok it's working
> > very well but when I connect it in a computer and run the software
> > SHOWTIME.bat included with the kit, happens the follow:
> > 1. The software can't find the signal DCD (1PPS)
> > 2. The software can't establish communications with the unit in any of
> > RS232 ports or speeds.

Josi:
Sounds to me like you do not have SHOWTIME pointing to the correct COM
port on the computer. The search for the 1PPS on DCD happens outside of
any serial port routines and involves looking for a change of state
on the hardware pin, which is read with the absolute I/O port address
associated with COM1/2.

You didn't say what computer software you are using. If it is raw
MessDOS,
then it should read fine. If it is W95, then have you done any I/O port
re-mapping? If it is NT, then SHOWTIME doesn't run at all since NT runs
all I/O in protected mode. For either Windows 95 or NT, I recommend you
get a copy of the new TAC32 software -- use the web and go to
    http://www.cnssys.com/tac32
and either use the "Install from the Web" option or fetch the file
tac32s.exe
by ftp. The tac32s.exe installation software is also available from
    ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/tac32/

You also did not state which GPS receiver you are using -- the Motorola
ONCORE or the Garmin GPS-20.

You probably want to join the tacgps Email group. Go to
http://www.tapr.org
and then click in the "SIGS" button -- near the bottom of the list you
will
see the TAC group's address.

> > I'm using an antenna with 40 cm of length and BNC connector without
> > polarization.

40 cm is waaaaaaaay too long -- for GPS a quarter-wave is 5 cm. A real
GPS antenna is most recommended.

> > Looking to a scope , I see a permanent signal (words) coming out in TX
> > of port RS232 (#1 or #2).

The ports #1 and #2 should be identical.

> > For any answer please use my correct e-mail address:
> > andrade@yabae.cptec.inpe.br or andrade@coma.cptec.inpe.br
> >
> > JCA
>
> --
> Ron W5RKN
>
> also:
> rparsons@bga.com

I wonder what group at INPE Josi is in. My original TACs are running at
the radio telescopes (partially sponsored by INPE) at Fortaleza and
Itapetinga (Atiabia) -- I visited both locations about 2 months ago.

Tom Clark

14. [TACGPS:826] Motorola Oncore

From: Thomas Mahaney <fmarshal@mindspring.com>
Date: Fri, 7 Nov 1997 19:32:24 -0600 (CST)

To: tacgps@tapr.org
Message-ID: <3463C14D.60190708@mindspring.com>
Rendered body type: text/plain

I wonder if someone could help me with a little problem the Oncore. It
bought at the tapr booth in Dayton, and only recently got around to
working with it. I bought one of the Rs232 bds and it seems to be
working(oncore sees sats, I do test of the software on bd.) and I some
exprience because I do have an pvt-6(rx is not working at this time.) My
Main problem with Oncore is that it will not go into nmea(either
informat command) or dosaprs(qbasic nmea) .
Any thought on the matter

Thanks

Tom
Kd4dKw

15. [TACGPS:827] Re: Motorola Oncore

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Fri, 7 Nov 1997 20:47:28 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <3463D12D.4659@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Thomas Mahaney wrote:
>
> I wonder if someone could help me with a little problem the Oncore. It
> bought at the tapr booth in Dayton, and only recently got around to
> working with it. I bought one of the Rs232 bds and it seems to be
> working(oncore sees sats, I do test of the software on bd.) and I some
> exprience because I do have an pvt-6(rx is not working at this time.) My
> Main problem with Oncore is that it will not go into nmea(either
> informat command) or dosaprs(qbasic nmea) .
> Any thought on the matter
>
> Thanks
>
> Tom
> Kd4dKw

I presume the interface board you got is the "McKinney" board. It would
be
easiest to walk you thru the operation if you make it into a TAC clone,
which
involves adding one wire from pin 10 on the ONCORE 10-pin header (1PPS
Out)
to Pin 5 on the RS232 connector (DCD in). Then (assuming your computer
can
be "tricked" by feeding 0/+5 v into the DCD line and thinking it is
RS232 --
this works on about 99% of the machines around) you will have a
functional
TAC and any of the TAC software will run on it. What you will have is
shown
in the "How to emulate a TAC" on my aleph file server:

    ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/emulate.zip

(you will find both a PostScript and GIF drawing in emulate.zip -- the
wire
 I said to add is shown in the lower left corner of the drawing).

The problem may you are having comparing the ONCORE VP with the PVT-6 is
probably due to the fact that Motorola added a new set of 8-channel
binary
commands to the original 6-channel set.

You didn't say what computer you are using. In dumb old MessDOS, my
SHOWTIME
software will handle both the 6- and 8-channel versions. Go to

    ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/

and pick up the file success.tac for a pretty simple cookbook. Then go
to

    ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/distribution/

and look at README, then fetch the showtime_v334.zip file. When you do

what
README tells you, you will have both my SHOWTIME code and also
Motorola's
latest 6- or 8-channel controller software (in \tac\zip\motorola.zip).

If you are running in W95/NT, fetch Rick (WB2TNL) TAC32 code at

    http://www.cnssys.com/tac32

If you have trouble reaching Rick's host, you should fetch

ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/tac32/tac32s.exe

which is mirrored from ftp.cnssys.com

Hope this helped -- 73, Tom

16. [TACGPS:828] Re: Motorola Oncore

From: "Doug McKinney" <buoy@mcktech.com>
Date: Fri, 7 Nov 1997 22:25:11 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199711080530.VAA27232@mail.redshift.com>
Rendered body type: multipart/mixed

[No readable text body. See the preserved original monthly archive.]
[Inline non-text content: multipart/mixed; 1,550 bytes]

17. [TACGPS:829] Re: [Fwd: TAC2]

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Fri, 7 Nov 1997 22:32:59 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <3463E9B3.11A3@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Jose -- after reading another Email from you, I see that
you are using Garmin GPS-20 receivers. The GPS-20 will not
produce a 1PPS output signal until after it has locked onto
GPS satellite signals.

The GPS-20 does not have very high sensitivity. Since you said
that your antenna was a 40 cm (2 wavelength) piece of wire, I
now believe that your problem is that your antenna is so poor
that it is not seeing any satellites!

If you look at the RS232 NMEA messages with a terminal program
like PROCOMM, you should see a message beginning with $GPGSA.
The format of this message is like

   $GPGSA,am,N,x,x,x,x,x,x,x,x,p,h,v

am=either A or M for automatic or manual mode
N = 1 if not tracking, 2 if 2-D tracking or 3 if 3-D tracking
x,x,x... are the PRN satellite numbers being tracked (up to 8) by the
   receiver. If less than 8 satellites are being tracked, some of the
   x values are replaced by a <null>, so you will see a sting of commas
   (like ,,,,,,,).
At the end of the of the message, p,h,& v are the PDOP, HDOP and VDOP
values for the satellites being tracked. If you see <nulls> here it
again says that you are not trqacking enough satellites.

After you connect a real antenna, let the receiver observe the sky for
a while, until you see a $GPGSA message that does not have long strings
of ,,,,,,,, -- Then (only after it is tracking GPS satellites) will
the GPS-20 start generating 1PPS output signals. When it is generating
1PPS signals, then SHOWTIME will allow the initial test to pass.

Sorry that I was confused about which type of receiver you are using.

Tom Clark

18. [TACGPS:830] Re: GPS Time vs UTC Time

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Fri, 7 Nov 1997 23:12:01 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <3463F2B9.15B1@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

John Palmer wrote:
>
> Can anyone tell me the reason for the time difference between UTC time
> and GPS time?
>
> GPS time is 11 seconds ahead of UTC as observed by simultaneous
> monitoring WWV and the clock on a GPS receiver.
>
> Thanks,
>
> John, WA0NTT

Stewart Nelson's answer was correct. Let me add a bit more.

a. The current offset GPS-UTC is 12 seconds, since Jan 1.0 1997 (not
   11 as in your message)

b. In doing calculations of position, your receiver internally uses
   GPS time to guarantee that there aren't any discontimuities. Last
   New Year's Day there was a one second Leap-second discontinuity.
   The satellites move at speeds of 7 km/sec and such a discontinuity
   would have totally screwed up navigation all around the world if
   the receivers were internally running in UTC!

c. But the existence of GPS time can be TOTALLY IGNORED by GPS users.
   The GPS satellites broadcast the conversion from GPS to UTC time
   continuously.[A few early receivers ignored this broadcast info
   and had the GPS-UTC offset hard-coded in ROM. Such receivers did
   display really screwy timing. But I know of no rcvrs made in the
   past couple of years that have this flaw]. Your receiver internally
   knows both GPS and UTC time and displays UTC to you. The display of
   the time is a low priority task, so the displayed time (and the time
   in the RS232 NMEA messages) often lags "truth" by a fraction of a
   second. Your message said "... by monitoring WWV and the clock on
   a GPS receiver." -- I know of few (if any) user-class GPS receivers
   that normally display GPS time -- they ALLshow UTC!

d. Inside your receiver, time is known to a fraction of a microsecond.
   Some GPS receivers (OEM boards, not hand-helds) generate accurate
   1PPS timing signals. For several years, I've been working on my
   "Totally Accurate Clock" (TAC) project. With Motorola ONCORE OEM
   receivers, I'm able to get long-term precision (smoothness) and
   accuracy (comparing the TAC with the USNO's Master Clock) at levels
   of 20-30 nanoseconds (remember 1 nsec is the time it take light to
   travel 1 foot). TAPR has now made the TAC-2 available as a kit. You
   can see info on the TACs on TAPR's web site at
     http://www.tapr.org and then click on the "W3IWI/TAC-2" button
   and on my ftp file server at
     ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/
   where you will see GIF plots showing the performance of the TAC at
   sites all around the world.

e. FYI -- the next phase of the TAPR TAC project is to develop a board
   that will lock a good crystal to GPS to achieve Rubidium to Cesium
   performance levels. We expect to achieve accuracy levels better
   than 1:10e10 -- meaning frequency accuracy at 10 GHz of 1 Hz or
   better!

f. Stewart pointed you to the WECA club web pages, and I didn't see
   much of relevance to the subject. Instead, you might want to surf
   the US Naval Observatory's site at
     http://tycho.usno.navy.mil

73 de Tom, W3IWI

19. [TACGPS:831] Re: Motorola Oncore

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Sat, 8 Nov 1997 00:04:16 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <3463FFF4.6305@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Doug McKinney wrote:
>

> Tom, Attached is an applications note I wrote for NMEA ops. This should
> get you going. What I don't know is if you have the PC Controller
> software, if you do, then you can enter on the command line ioformat nmea.
> At that point the PC Controller is not useable and you need to type quit,

> at the command line. The ioformat nmea commands the ONCORE from 9600 8N1
> to 4800 8N1. You now can use ProComm to talk to the ONCORE. PC Controller
> doesn't work in NMEA mode. Tom Clark's TAC2 software has a GPS.BAT, which
> executes the latest Motorola PC Controller software under the Directory
> BIN. Good luck.
> Doug

Good posting, Doug. One small thing -- for the older 6-channel
receivers,
where your text shows @@Ea, the user should substitute @@Ba. There are
several other of the proprietary commands where @@E* translates to @@B*.
In SHOWTIME, I send both commands when these cases happen -- the
receiver
ignores the one that is not applicable. Rick's TAC32 also handles both
the
old/new 6/8 channels cases.

Tom

20. [TACGPS:832] Re: DOS Display program for GPS-30

From: "Steven R. Bible" <srbible@gate.net>
Date: Sat, 8 Nov 1997 09:41:51 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19971108103616.0081e490@pop.gate.net>
Rendered body type: text/plain

Don, I didn't see an answer to your post on the TACGPS list. Take a look
at Peter Bennett's FTP site at

    ftp://sundae.triumf.ca/pub/peter/index.html

There are dozens of programs to choose from.

73, Steve N7HPR

At 09:06 PM 11/2/97 -0600, you wrote:
>Is there a DOS program around that will pick off the data from the GPS-30
>(*without* the TAC board) and display the lat/long, etc.?
>
>A terminal program of course displays the raw "sentences" but it would be
>handy to have it displayed in fixed position screen format. I looked on the
>TAPR FTP, but didn't find one. It wouldn't take much effort to cobble up a
>program (but it takes even less to download one & I expect there are many
>that do this).
>
>73's
>Don, W4DH
>
>

 - Steve, N7HPR
 (n7hpr@tapr.org)

21. [TACGPS:833] Xtal locked to GPS

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Sat, 8 Nov 1997 12:45:53 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199711081841.NAA24932@aus-d.mp.campus.mci.net>
Rendered body type: text/plain

>e. FYI -- the next phase of the TAPR TAC project is to develop a board
>   that will lock a good crystal to GPS to achieve Rubidium to Cesium
>   performance levels. We expect to achieve accuracy levels better
>   than 1:10e10 -- meaning frequency accuracy at 10 GHz of 1 Hz or
>   better!
>73 de Tom, W3IWI
>

I noticed the above in Re: [TACGPS:830] Re: GPS Time vs UTC Time.

1.   Any rough time frame when the board might be available? (months,
years, decades, eons?)

I like to keep a rough plan of future projects in mind. The idea of shack
freq standard has been a project (very low on the list) for at least 35
years...maybe the time to do it is about to arrive!

2.   Could you say something about the scheme and error sources/control?

I tinkered with a digital phase-lock of a M6800 micro to WWVB some 15-20
years ago. I concluded that the minimum bandwidth of the phase-locked loop,
and hence the deviation from the received WWVB, was set by the rate of
frequency change due to temp changes. I haven't analyzed the GPS situation,
but seat-of-the-pants suggests that in achieving 1 part in 10e10 things such
as xtal freq drift due to temp will be noticeable during the 1 second
intervals between xtal & gps comparisons.

Very interesting project!

Regrads,

Don, W4DH

22. [TACGPS:834] Re: GPS Time vs UTC Time

From: Bob Johnson <wb4jcm@amsat.org>
Date: Sat, 8 Nov 1997 21:10:40 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <3.0.2.32.19971108220213.0069292c@rio.atlantic.net>
Rendered body type: text/plain

>Subject: Re: GPS Time vs UTC Time

>> Can anyone tell me the reason for the time difference between UTC time
>> and GPS time?
>>
>> GPS time is 11 seconds ahead of UTC as observed by simultaneous
>> monitoring WWV and the clock on a GPS receiver.
>>
>> Thanks,
>>
>> John, WA0NTT
>
[most of replies omitted...]
>c. But the existence of GPS time can be TOTALLY IGNORED by GPS users.
>   The GPS satellites broadcast the conversion from GPS to UTC time
>   continuously.[A few early receivers ignored this broadcast info
>   and had the GPS-UTC offset hard-coded in ROM. Such receivers did
>   display really screwy timing. But I know of no rcvrs made in the
>   past couple of years that have this flaw]. Your receiver internally
>   knows both GPS and UTC time and displays UTC to you.[...]

Perhaps his receiver is similar to my (very early) Magellan Trailblazer.
On its default "POSITION" display (showing the current fix), it typically
displays time that is several seconds behind the correct time (I just went
out and got a fix: it was four seconds behind UTC, while on other days I
think I've seen up to eight seconds). In another display mode (the
AUX/SETUP menu) it displays the correct UTC time. I finally decided (after
re-reading the manual) that the time on the "current fix" display is the
time at which that fix was valid, which apparently can lag real time by
several seconds. Presumably this is due to the algorithm it uses to
reconcile data obtained from sequentially-scanned satellites, and I guess
it would vary depending on how many satellites are being tracked.

-- Bob Johnson
   WB4JCM@amsat.org

-- Bob Johnson

   Above comments are personal and are not intended to reflect
   the official position of any other person or corporation.

23. [TACGPS:835] Re: GPS Time vs UTC Time

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Sun, 9 Nov 1997 01:24:04 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <346563CC.6ABF@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Bob Johnson,WB4JCM wrote:
[SNIP]
> Perhaps his receiver is similar to my (very early) Magellan Trailblazer.
> On its default "POSITION" display (showing the current fix), it typically
> displays time that is several seconds behind the correct time (I just went
> out and got a fix: it was four seconds behind UTC, while on other days I
> think I've seen up to eight seconds). In another display mode (the
> AUX/SETUP menu) it displays the correct UTC time. I finally decided (after

> re-reading the manual) that the time on the "current fix" display is the
> time at which that fix was valid, which apparently can lag real time by
> several seconds.

Some of the early receivers (circa 1992-3) had a firmware flaw that the
GPS-UTC offset (i.e. accumulated leapseconds) was hardcoded (I recall
one
case when it was fixed at 7 or 8 seconds) rather than taking the current
offset (and pending leapsecond status) from the 1500 bit GPS navigation
message. I don't recall which brand it was for sure, but I think it
began
with "M".

To my knowledge, all current receivers properly pick up the leapsecond
from
the nav message. If you do a dump of NMEA messages on either the
Motorola
or Garmin OEM boards every ~18 months when a leapsecond happens, they
properly report the seconds as ...57,58,59,60,00,01...

Just to set the record straight, my SHOWTIME code has a simplifying
approximation so it will display (not qite correctly) the seconds as
 ...57,58,59,00,00,01... when a leapsecond happens. I don't know about
Rick's TAC32 code but I suspect it will does the same thing. In case
you
wonder why, the reason is that we read the UTC time from the serial data
port (which arrives late, at an indeterminate epoch mid-second), and
then
increment the time to the next second in the software, and finally act
on
the incremented value when the hardware 1PPS signal arrives on the RS232
DCD line.

73, Tom

24. [TACGPS:836] Status of GPS30PC Purchase

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Mon, 10 Nov 1997 00:44:54 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <v03110707b08c5840b00c@[208.134.134.40]>
Rendered body type: text/plain

TAPR was able to get another 50 GPS30PC's from Garmin after we closed the
purchase to handle the people that where calling wanting an extra unit here
or there. This was on top of the 50 we ordered above the group purchase
number.

So ---- Dorothy has reported that we have an extra 20 or so GPS30PC left
over for various reasons.

If you want a GPS30PC as part of the $99 group purchase call Dorothy
starting Tuesday (940) 383-0000 with Credit information handy.

For details can be found on http://www.tapr.org

I expect these to go fast!

Cheers - Greg

Greg Jones, WD5IVD
Austin, Texas
wd5ivd@tapr.org
http://www.tapr.org/~wd5ivd

25. [TACGPS:837] Re: TAC32 Version 1.0.16 is available

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Tue, 11 Nov 1997 14:36:28 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <01BCEEB7.930A8FA0@rick.cnssys.com>
Rendered body type: text/plain

To all TAC32 testers,

I have followed up on Tom's concern about slow download time. Effective immediately, all the files
associated with InstallFromTheWeb, PackageFromTheWeb and FTP have been mirrored on one of my ISP's high
speed servers. This should improve installation and download performance, especially for those of you
with high speed Internet access. This should relieve Tom of the need to mirror the files.

You still go to http://www.cnssys.com/tac32 with your browser regardless of which type of installation or download you want. Access to the new server is totally transparent for FTP and PackageForTheWeb. For InstallFromTheWeb you will be asked which server you want to load from. Choose "ClarkNet" to access the new high speed server and avoid the slower and sometimes congested lines to my company's server.

Now that I am back from two weeks on the road I will begin work on the remaining new features and the bugs which a couple of you have reported.

Thanks,

Rick
WB2TNL

-----Original Message-----
From: Dr Thomas A Clark (W3IWI) [SMTP:clark@tomcat.gsfc.nasa.gov]
Sent: Monday, November 03, 1997 1:50 PM
To: tacgps@tapr.org
Subject: [TACGPS:814] Re: TAC32 Version 1.0.16 is available

Richard M. Hambly wrote:
>
> All TAC32 testers,
>
> Here is another release of the TAC32 software. There are quite a few changes that you should find interesting. I am working my way up to the point where every feature from Showtime is reflected in TAC32 so I can get to work on additional features that are not in Showtime. This release gets me another step of the way to that goal.
>
> Complete information and downloading directions are on the TAC32 Web page at http://www.cnssys.com/tac32/
>
> As always, I look forward to your comments and suggestions.
>
> Rick
> WB2TNL

Since Rick's cnsys.com host has a fairly slow internet connection, I have mirrored his files (but not the "Install from Web") at

  ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/tac32/

The current files on aleph have a date/time stamp Nov.3 @ approx 13:30 and correspond to Rick's files of Nov.3 @ 01:45

73, Tom

26. [TACGPS:838] Motorola GPs

From: "tom dennis" <tdenis@co.tds.net>
Date: Wed, 12 Nov 1997 10:13:20 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199711121610.KAA14496@mail.tds.net>
Rendered body type: text/plain

Would anyone know about the Motorola model T5398A. It also has a model # PUT602N323. How about wiring to a computer? Software? It has a nine pin RS232 port and a antenna connection only.
Thanks
Tom

27. [TACGPS:839] Re: Motorola GPs

From: mdmiller@onramp.net
Date: Wed, 12 Nov 1997 19:27:16 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19971112191413.0099ac20@199.1.11.3>
Rendered body type: text/plain

I am not familiar with that part number, but if it is 19" rackmountable I would bet that there is a Motorla Basic or Oncore in inside of it. Do you know what is was used for?
Mark Miller
N5RFX

At 10:13 AM 11/12/97 -0600, you wrote:
>Would anyone know about the Motorola model T5398A. It also has a model # >PUT602N323. How about wiring to a computer? Software? It has a nine pin >RS232 port and a antenna connection only.
>Thanks
>Tom
>

>
>

28. [TACGPS:840] TAC32 Problems

From: mdmiller@onramp.net
Date: Wed, 12 Nov 1997 19:37:26 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19971112193115.009a1860@199.1.11.3>
Rendered body type: text/plain

I have had problems keeping TAC32 running for more than about 12 hours.
Most of the time it locks up my computer(after 12 hours), I have had 1
instance of an out of memory message and one message shown below:

TAC32 caused an invalid page fault in
module MFC42.DLL at 0137:5f40129c.
Registers:
EAX=00000000 CS=0137 EIP=5f40129c EFLGS=00010246
EBX=5f4cbe38 SS=013f ESP=00e3fa94 EBP=00e3fac8
ECX=00000000 DS=013f ESI=008245f0 FS=25d7
EDX=00000003 ES=013f EDI=005c022c GS=1dbe
Bytes at CS:EIP:
8b 71 04 85 f6 57 74 26 8b 7c 24 0c 33 d2 8b c7
Stack dump:
008245f0 5f4119b5 00000ca4 5f4cbe38 005c022c 005c0160 5f41b40d 00000001
005c0160 005c0160 00e3fc40 5f48f6b4 00000000 00e3faec 5f404a5a 005c027c

The computer TAC32 runs on is a 486 DX2 50 Windows 95 with 12 MB of ram.
The GPS is a VP Oncore connected to a TAC2 kit. The TAC32 version is 1.1.16

Any ideas?

73
Mark Miller
N5RFX

29. [TACGPS:841] RE: TAC32 Problems

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Thu, 13 Nov 1997 14:00:36 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <01BCF043.FAF27500@rick.cnssys.com>
Rendered body type: multipart/mixed

[No readable text body. See the preserved original monthly archive.]
[Inline non-text content: multipart/mixed; 812 bytes]

30. [TACGPS:842] TAC32 Problems

From: mikebw@bilow.bilow.uu.ids.net (Mike Bilow)
Date: Fri, 14 Nov 1997 15:36:45 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <46c7de66@bilow.bilow.uu.ids.net>
Rendered body type: text/plain

mdmiller wrote in a message to Mike Bilow:

 m> I have had problems keeping TAC32 running for more than
 m> about 12 hours. Most of the time it locks up my
 m> computer(after 12 hours), I have had 1 instance of an out of
 m> memory message and one message shown below:

 m> TAC32 caused an invalid page fault in
 m> module MFC42.DLL at 0137:5f40129c.
 m> Registers:
 m> EAX=00000000 CS=0137 EIP=5f40129c EFLGS=00010246
 m> EBX=5f4cbe38 SS=013f ESP=00e3fa94 EBP=00e3fac8
 m> ECX=00000000 DS=013f ESI=008245f0 FS=25d7
 m> EDX=00000003 ES=013f EDI=005c022c GS=1dbe
 m> Bytes at CS:EIP:
 m> 8b 71 04 85 f6 57 74 26 8b 7c 24 0c 33 d2 8b c7
 m> Stack dump:
 m> 008245f0 5f4119b5 00000ca4 5f4cbe38 005c022c 005c0160
 m> 5f41b40d 00000001 005c0160 005c0160 00e3fc40 5f48f6b4
 m> 00000000 00e3faec 5f404a5a 005c027c

 m> The computer TAC32 runs on is a 486 DX2 50 Windows 95 with
 m> 12 MB of ram. The GPS is a VP Oncore connected to a TAC2
 m> kit. The TAC32 version is 1.1.16

Well, I suppose that my first posting on this list should be something I don't

really know anything about! I'm no Win32 expert, but what is going on here looks from the dump like copying from the code segment. It is common for Windows compilers to keep constant data in the code segment, for a lot of good reasons. However, code segments are "discardable," meaning that they are never swapped to disk because they are never modified, so Windows will simply reload them as needed from the original file.

This is Ring 3 code running -- you can see that immediately from the selector values -- so Windows should have intercepted any attempt to access an invalid page and handled it by reloading the page. If this didn't happen, the most likely cause is that you were out of memory, or at least your process was. Even if the process is not leaking memory, it might be leaking LDT descriptors, especially if it is frequently accessing a device through a driver, and that would cause this sort of fault.

Another very slim possibility is that your disk could have a problem, and that Windows is not handling the error very gracefully. For example, if you have power management enabled and you allow your disk to spin down after inactivity, then you could see this kind of fault under certain circumstances.

-- Mike, N1BEE

31. [TACGPS:843] JAVA GPS Display

From: "Chandler, Jim" <jchandler@dsatex.com>
Date: Fri, 14 Nov 1997 16:33:41 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <97Nov14.162625cst.26881@texas.dsatex.com>
Rendered body type: text/plain

Version 1.0 of a JAVA GPS display program for use with the Garmin GPS30PC in located on the tapr ftp site under software_lib/upload. Run GPSDISP.exe to extract a readme and another executable that will install the program. Even though this is a JAVA application, it currently will only run on a PC (see the readme file). I hope to upgrade and enhance this program soon.

Jim, N0VH

jchandle@flash.net, n0vh@juno.com

32. [TACGPS:844] Antenna cables.

From: "Henk Uijterwaal (RIPE-NCC)" <henk@ripe.net>
Date: Wed, 19 Nov 1997 09:28:58 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <Pine.SUN.3.95.971119133653.18487C-100000@ncc.ripe.net>
Rendered body type: text/plain

I have to install a TAC plus (Motorola) GPS antenna at a remote site. The TAC will be sitting in a computer room and the antenna on the roof of the building. There are already cables running from the computerroom to the roof.

The Motorola manual says that the input impedance of the antenna is 50 Ohm, so, with my limited knowledge of these things, I'd expect that I'd have to use 50 Ohm coaxial cable to connect them. However, the impedance of the cables that are running to the computer room is 75 Ohm. Does anybody know if one can just use these cables, if there is any trick to use them or should we run a new cable?

Henk


```
-------------------------------------------------------------------------------
Henk Uijterwaal                    Email: henk.uijterwaal@ripe.net
RIPE Network Coordination Centre     WWW: http://www.ripe.net/home/henk
Singel 258                         Phone: +31.20.535-4414,  Fax -4445
1016 AB Amsterdam                   Home: +31.20.6651962
The Netherlands                    Pager: +6.57626855
-------------------------------------------------------------------------------
```


%DCL-E-NOCFFE, unable to locate coffee - keyboard input suspended.

33. [TACGPS:845] GPS-30 TAPR special purchase: connectors?

From: mikebw@bilow.bilow.uu.ids.net (Mike Bilow)
Date: Wed, 19 Nov 1997 15:41:27 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <4731e401@bilow.bilow.uu.ids.net>

Rendered body type: text/plain

I just received one of the GPS-30 special purchase units from TAPR. This is
the GPS-20 board encased in a sealed housing, which I have removed. There is
an unusual connector on the GPS-20 which is used to interface it to the rest of
the world. However, the TAC-2 documentation just says that, if you ordered the
GPS-20 from TAPR, it would come with the necessary connector.

On the connector that comes inside the GPS-30, there are no female pins for any
of the unwired signals, although there is a plastic shell for the connector.
The key issue, obviously, is that I want to attach to 1 PPS. How can I get the
connector, or at least some female pins for the shell I have?

-- Mike, N1BEE

34. [TACGPS:846] Antenna cables.

From: mikebw@bilow.bilow.uu.ids.net (Mike Bilow)
Date: Wed, 19 Nov 1997 15:41:56 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <4731e400@bilow.bilow.uu.ids.net>
Rendered body type: text/plain

RIPE-NCC wrote in a message to Mike Bilow:

 R> I have to install a TAC plus (Motorola) GPS antenna at a
 R> remote site. The TAC will be sitting in a computer room and
 R> the antenna on the roof of the building. There are already
 R> cables running from the computerroom to the roof.

 R> The Motorola manual says that the input impedance of the
 R> antenna is 50 Ohm, so, with my limited knowledge of these
 R> things, I'd expect that I'd have to use 50 Ohm coaxial cable
 R> to connect them. However, the impedance of the cables that
 R> are running to the computer room is 75 Ohm. Does anybody
 R> know if one can just use these cables, if there is any trick
 R> to use them or should we run a new cable?

First, GPS operates at fairly high frequency where cable losses can be severe.
To go more than a few meters, you would have to use high quality and therefore
very expensive cable.

Second, why would a computer room have 75 ohm coax? The only types of coax you
are likely to see in a computer room are 50 ohm, which is used for Ethernet,
and 93 ohm, which is used in certain mainframe or ARCnet applications.
However, 75 ohm cable is most commonly used for video.

So, the answer is that you probably cannot use the cable because of the
impedance issue and probably do not want to use it even if was the correct
impedance because of the loss issue.

-- Mike

35. [TACGPS:847] Re: Antenna cables.

From: clark@tomcat.gsfc.nasa.gov (Tom Clark -- W3IWI)
Date: Wed, 19 Nov 1997 16:44:45 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <44340@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Henk Uitjerwaal asked

> I have to install a TAC plus (Motorola) GPS antenna at a remote site. The
> TAC will be sitting in a computer room and the antenna on the roof of the
> building. There are already cables running from the computerroom to the
> roof.
>
> The Motorola manual says that the input impedance of the antenna is 50
> Ohm, so, with my limited knowledge of these things, I'd expect that I'd
> have to use 50 Ohm coaxial cable to connect them. However, the impedance
> of the cables that are running to the computer room is 75 Ohm. Does
> anybody know if one can just use these cables, if there is any trick to
> use them or should we run a new cable?

Mike Bilow gave a pretty negative response. Let me be a bit more upbeat.

Mike was correct in saying that cable losses can become a problem. Henk --
how long is the cable run. If less than ~20 meters, it shouldn't be much
of a problem. If it is more than ~50 meters, you will have difficulty.

Now I will run counter to Mike's statement -- you will take a fairly
minor "hit" by using 75 ohm cable in a 50 ohm system -- the Voltage Standing
Wave Ratio (VSWR) is only 1.5:1, which will lead to ~2 dB of excess loss.

Many of the ~7 mm diameter 75 ohm cables (like RG59) have less loss than
their 50 ohm counterparts (like RG58) and at about 20 meters or so, the
lower losses in RG59 actually WIN over RG58 at the GPS L-band frequency!
Some of the 75 ohm coax cable (often incorrectly called "RG-6" here in
the USA) is made with a low-loss foam dielectric and it is quite good
at the GPS frequency. Such cable is sold here for installation of the
small (~50 cm diameter) Ku-band satellite dishes. FYI -- the downconverter
in the Ku-band dish systems (located at the dish feed) typically has a
900-1500 MHz IF output. The GPS L1 frequency is at 1575 MHz, at the top
end of the DSS IF spectrum. So the cables that work for a DSS dish system
will probably work just fine for GPS.

My best advice is to try it. If you see that the strongest satellites
show SNRs of 30 dB or more (as displayed in SHOWTIME or TAC32, or as
seen in the $GPGSV NMEA message) and if you see 5-7 satellites most
of the time, then the cable is fine. If you are only getting peak SNRs
(like for satellites above ~60 deg elevation) of 20 dB or if you are
only locking on 2-4 satellites, then the cable is hurting you and you
should try to replace it. If you don't lock up on ANY satellites, then
the cable is a total disaster!

Regards, Tom

36. [TACGPS:848] Re: GPS-30 TAPR special purchase: connectors?

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Wed, 19 Nov 1997 17:02:57 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <v03110708b0991bd36fee@[208.134.134.40]>
Rendered body type: text/plain

It is a JST connector.

Anyway, TAPR now has the Garmin GPS-20 and GPS-25 data interface cables.
You can call or e-mail Dorothy. We had the JST connectors at one time, but
a vast majority of people said they couldn't solder the onto the connectors.

Greg

>I just received one of the GPS-30 special purchase units from TAPR. This is
>the GPS-20 board encased in a sealed housing, which I have removed. There is
>an unusual connector on the GPS-20 which is used to interface it to the
>rest of
>the world. However, the TAC-2 documentation just says that, if you
>ordered the
>GPS-20 from TAPR, it would come with the necessary connector.
>
>On the connector that comes inside the GPS-30, there are no female pins
>for any
>of the unwired signals, although there is a plastic shell for the connector.
>The key issue, obviously, is that I want to attach to 1 PPS. How can I
>get the
>connector, or at least some female pins for the shell I have?
>
>-- Mike, N1BEE

Greg Jones, WD5IVD
Austin, Texas
wd5ivd@tapr.org
http://www.tapr.org/~wd5ivd

37. [TACGPS:849] Re: Antenna cables.

From: Dave Martindale <davem@cs.ubc.ca>
Date: Wed, 19 Nov 1997 17:03:21 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199711192249.OAA01127@grolsch.cs.ubc.ca>
Rendered body type: text/plain

R> I have to install a TAC plus (Motorola) GPS antenna at a
R> remote site. The TAC will be sitting in a computer room and
R> the antenna on the roof of the building. There are already
R> cables running from the computerroom to the roof.

```
 R> The Motorola manual says that the input impedance of the
 R> antenna is 50 Ohm, so, with my limited knowledge of these
 R> things, I'd expect that I'd have to use 50 Ohm coaxial cable
 R> to connect them.  However, the impedance of the cables that
 R> are running to the computer room is 75 Ohm.  Does anybody
 R> know if one can just use these cables, if there is any trick
 R> to use them or should we run a new cable?

First, GPS operates at fairly high frequency where cable losses
can be severe.  To go more than a few meters, you would have to
use high quality and therefore very expensive cable.

Second, why would a computer room have 75 ohm coax?  The only
types of coax you are likely to see in a computer room are 50
ohm, which is used for Ethernet, and 93 ohm, which is used in
certain mainframe or ARCnet applications.  However, 75 ohm
cable is most commonly used for video.

So, the answer is that you probably cannot use the cable
because of the impedance issue and probably do not want to use
it even if was the correct impedance because of the loss
issue.

Well, it's more complex than that.

First, you can't expect to put a passive antenna on the roof and get
decent signal strength in a room several stories below unless you use
some very low-loss (and large) cable.  But if you have an active antenna
(with internal preamp) this can work quite well.  I've used a Lowe
active antenna with 50 or 60 additional feet of RG-58 between the GPS
and the antenna's own 15-foot cable.  There are antennas designed for
rooftop mounting which have even more gain, specifically to deal with
even longer cable runs.

Second, most GPS hardware is designed for 50 ohm cable impedance.
If you use 75 ohm cable instead, there will be some power reflected
back at the 50-to-75-ohm junctions.  You will have two of these in
the system.  However, the signal loss per unit length of RG-59 (75 ohm)
cable is *less* than RG-58 (50 ohm) cable.  So by using 75-ohm cable,
you take a fixed loss penalty that is independent of length, plus there
is a *gain* compared to RG-58 proportional to length.  For long runs,
you will actually get more signal at the GPS receiver using 75 ohm cable
than using 50 ohm cable of similar size.

(There can also be problems with signals being reflected twice at impedance
mismatches being received at the GPS delayed in time and distorting the
desired signal.  For long runs of cable, the attenuation caused by two
passes along the length of the cable reduces the reflections to a level
where they are insignificant).

Anyway, in *some* circumstances 75 ohm cable actually works better than
50 ohm.  Try it.  If it doesn't work well, try using 50 ohm cable instead.
Or just use larger cable (lower loss) of either impedance.  Or use
a different antenna with more gain.

        Dave
```

38. [TACGPS:850] Re: Antenna cables.

```
From: mikebw@bilow.bilow.uu.ids.net (Mike Bilow)
Date: Thu, 20 Nov 1997 05:33:39 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <4740e3b1@bilow.bilow.uu.ids.net>
Rendered body type: text/plain
```

Tom Clark -- W3IWI wrote in a message to Mike Bilow:

```
 TC-W> Mike Bilow gave a pretty negative response. Let me be a bit
 TC-W> more upbeat.

:-)

 TC-W> Now I will run counter to Mike's statement -- you will take
 TC-W> a fairly minor "hit" by using 75 ohm cable in a 50 ohm
 TC-W> system -- the Voltage Standing Wave Ratio (VSWR) is only
 TC-W> 1.5:1, which will lead to ~2 dB of excess loss.

My concern, which I probably should have expressed more clearly, is: what is in
the walls?  The question concerned using the 75 ohm coax already in the
building, which is probably of unknown quality and origin.  My guess is that it
```

is standard video coax, the sort of thing that often says "Color TV" on the
jacket, as if color needed better cable than black and white. The original
post said:

> There are already cables running from the computerroom to the roof.

I cannot think of any good reason why 75 ohm coax would be run for computer
networking purposes, neither for Ethernet (50 ohm) nor ARCnet or SNA (93 ohm).

 TC-W> The GPS L1 frequency is at 1575 MHz, at the top end of the DSS
 TC-W> IF spectrum. So the cables that work for a DSS dish system will
 TC-W> probably work just fine for GPS.

Something like Belden 1829A? What are the odds this is what is in the wall?

 TC-W> My best advice is to try it.

No one could argue with that advice, certainly.

-- Mike, N1BEE

39. [TACGPS:851] GPS-30PC Units

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Thu, 20 Nov 1997 18:18:52 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <v0311070db09a7fde0108@[208.134.134.40]>
Rendered body type: text/plain

Just as an update. Dorothy found a box of GPS30PC that had been covered up
after the return from the DCC ---- thus TAPR has 25 GPS30PC units left.

Cheers - Greg

Greg Jones, WD5IVD
Austin, Texas
wd5ivd@tapr.org
http://www.tapr.org/~wd5ivd

40. [TACGPS:852] Re: JAVA GPS Display

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Sun, 23 Nov 1997 21:09:50 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199711240300.WAA11298@aus-f.mp.campus.mci.net>
Rendered body type: text/plain

At 04:33 PM 11/14/97 -0600, you wrote:
>Version 1.0 of a JAVA GPS display program for use with the Garmin GPS30PC
>in located on the tapr ftp site under software_lib/upload. Run
>GPSDISP.exe to extract a readme and another executable that will install
>the program. Even though this is a JAVA application, it currently will
>only run on a PC (see the readme file). I hope to upgrade and enhance
>this program soon.
>
>
>
>Jim, N0VH
>
>jchandle@flash.net, n0vh@juno.com
>

Jim,

Sounds interesing. Do you have the full url? I rummaged around and didn't
find gpsdisp.exe in:

ftp://ftp.tapr.org/tapr/software_lib/upload/"

nor other directories.

Don, W4DH

41. [TACGPS:853] GPS Display

From: "Chandler, Jim" <jchandler@dsatex.com>
Date: Mon, 24 Nov 1997 08:11:45 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <97Nov24.080923cst.26881@texas.dsatex.com>

Rendered body type: text/plain

Donald E. Haselwood wrote:

Don,

  Chech out ftp://ftp.tapr.org/tapr/software_lib/gps. I guess they have moved it since I uploaded it. I hope to have a website this weekend! Let me know how you like it and ways to improve it. Thanks

Jim

>

> At 04:33 PM 11/14/97 -0600, you wrote:

> >Version 1.0 of a JAVA GPS display program for use with the Garmin GPS30PC

> >in located on the tapr ftp site under software_lib/upload. Run

> >GPSDISP.exe to extract a readme and another executable that will install

> >the program. Even though this is a JAVA application, it currently will

> >only run on a PC (see the readme file). I hope to upgrade and enhance

> >this program soon.

> >

> >

> >

> >Jim, N0VH

> >

> >jchandle@flash.net, n0vh@juno.com

>>

>

> Jim,

>

> Sounds interesing. Do you have the full url? I rummaged around and didn't

> find gpsdisp.exe in:

>

> ftp://ftp.tapr.org/tapr/software_lib/upload/"

>

> nor other directories.

>

> Don, W4DH

42. [TACGPS:854] GPS group

From: Gilbert Baron <gbaron@sparc.isl.net>
Date: Mon, 24 Nov 1997 12:11:24 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <3479C215.31DF@sparc.isl.net>
Rendered body type: text/plain

Has there been any thought of changing or adding to the group buy to make the GPS12-XL available. It is a MUCH better unit. It is 12 channel

and is MUCH faster and MUCH more accurate. The current unit is really
ancient technology.
In addition the current price on the current unit is no longer a
bargain.
--
Gil gbaron@sparc.isl.net
Bailar es vivir
http://www.geocities.com/Yosemite/Trails/4168

43. [TACGPS:855] Re: GPS group

From: clark@tomcat.gsfc.nasa.gov (Tom Clark -- W3IWI)
Date: Mon, 24 Nov 1997 13:14:31 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <45233@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Gil asked:

> Has there been any thought of changing or adding to the group buy to
> make the GPS12-XL available. It is a MUCH better unit. It is 12 channel
> and is MUCH faster and MUCH more accurate. The current unit is really
> ancient technology.
> In addition the current price on the current unit is no longer a
> bargain.

Maybe one of us is confused. TACGPS has focussed on single-board OEM receivers
for time/frequency applications. The 12XL is a handheld, standalone unit. I
haven't checked on the board inside the 12XL, but I did make some quick tests
on the guts of the Garmin GPS-III+ (which I think is the same) and I was
unable to locate any signal that looked like a hardware 1PPS that could be
tapped, so that it could be incorporated into the TAC activity.

The 12-channel parallel OEM rcvr board is the GPS-25. Greg has indicated that
he hopes to replace the GPS-20 TAPR offering with the -25. I've asked him
to get me a sample so that we can make sure of its timing characteristics,
but so far I haven't seen one to "certify".

73, Tom

44. [TACGPS:856] Re: GPS group

From: Gilbert Baron <gbaron@sparc.isl.net>
Date: Mon, 24 Nov 1997 14:10:25 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <3479DE1E.7DE1@sparc.isl.net>
Rendered body type: text/plain

Tom Clark -- W3IWI wrote:
>
> Gil asked:
>
> > Has there been any thought of changing or adding to the group buy to
> > make the GPS12-XL available. It is a MUCH better unit. It is 12 channel
> > and is MUCH faster and MUCH more accurate. The current unit is really
> > ancient technology.
> > In addition the current price on the current unit is no longer a
> > bargain.
>
> Maybe one of us is confused. TACGPS has focussed on single-board OEM receivers
> for time/frequency applications. The 12XL is a handheld, standalone unit. I
> haven't checked on the board inside the 12XL, but I did make some quick tests
> on the guts of the Garmin GPS-III+ (which I think is the same) and I was
> unable to locate any signal that looked like a hardware 1PPS that could be
> tapped, so that it could be incorporated into the TAC activity.
>

I am sorry that I did not realize the purpose of the GPS for this group.
Nevertheless it would be nice to get a handheld unit for a good price if
possible. The unit does have a pc interface connection so I assume it
could be used for all that you want but I do not know that.

> The 12-channel parallel OEM rcvr board is the GPS-25. Greg has indicated that
> he hopes to replace the GPS-20 TAPR offering with the -25. I've asked him

I am not so sure of that, maybe maybe not. The 12Xl is VERY new.

> to get me a sample so that we can make sure of its timing characteristics,
> but so far I haven't seen one to "certify".
>

I can tell you this unit has been certified as among the best in the
field. Navagation is my only interest in GPS so perhaps I am at the
wrong place. I was only hoping that I could get my GPS before the summer
hiking and conoeing starts at a good price. I see that this is probably
not the place and after seeing what activity is here I will probably
unsubscribe.
Thanks for the information.

--
Gil gbaron@sparc.isl.net
Bailar es vivir
http://www.geocities.com/Yosemite/Trails/4168

45. [TACGPS:857] Re: GPS Display

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Mon, 24 Nov 1997 14:17:02 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <v03110706b09f896e981a@[208.134.134.40]>
Rendered body type: text/plain

Hi.

Just as an update on how the various software upload areas work. When you
upload to a TAPR software area, like upload, it is only readable by whoever
is responsible for the area. As the README says, you need to send an
e-mail to that person so they no something needs quick attention -- else it
might sit a few days. They then move it over to the correct directory once
they check the file to make sure it is okay.

This resulted last year when TAPR.ORG was hit by a plague of people using
the system for swaping stolen and very shady software. Tied up huge
amounts of disk space and system throughput. Anyway, we have to maintain
this, becuase we still get software that appears and we would be considered
at fault if we allowed it to be downloaded. Just the other day some crank
uploaded about 20 Megs of @!(#$* about how to use stolen credit cards, how
to break into ATM machines, and other stuff. That was fun doing the big rm
on.

One of the ills of having a good system with big pipes these days. The day
of complete openness has long been gone.

When you get that new site going, let me know and I'll add a link on the
SIG listing. Also, hope to see further updates on the TAPR site, since
that is how we keep the yearly CD updated.

Cheers - Greg

>Donald E. Haselwood wrote:
>
>Don,
>
> Chech out ftp://ftp.tapr.org/tapr/software_lib/gps. I guess they have
>moved it since I uploaded it. I hope to have a website this weekend!
>Let me know how you like it and ways to improve it. Thanks
>
>
>
>Jim
>
>>
>
>> At 04:33 PM 11/14/97 -0600, you wrote:
>
>> >Version 1.0 of a JAVA GPS display program for use with the Garmin
>GPS30PC
>
>> >in located on the tapr ftp site under software_lib/upload. Run
>
>> >GPSDISP.exe to extract a readme and another executable that will
>install
>
>> >the program. Even though this is a JAVA application, it currently
>will
>
>> >only run on a PC (see the readme file). I hope to upgrade and
>enhance
>

>> >this program soon.
>
>> >
>
>> >
>
>> >
>
>> >Jim, N0VH
>
>> >
>
>> >jchandle@flash.net, n0vh@juno.com
>
>>>
>
>>
>
>> Jim,
>
>>
>
>> Sounds interesing. Do you have the full url? I rummaged around and
>didn't
>
>> find gpsdisp.exe in:
>
>>
>
>> ftp://ftp.tapr.org/tapr/software_lib/upload/"
>
>>
>
>> nor other directories.
>
>>
>
>> Don, W4DH
>
>
>
>
>

Greg Jones, WD5IVD
Austin, Texas
wd5ivd@tapr.org
http://www.tapr.org/~wd5ivd

46. [TACGPS:858] Re: GPS group

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Mon, 24 Nov 1997 14:42:07 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <v0311070cb09f91bb8b6a@[208.134.134.40]>
Rendered body type: text/plain

We will be adding the Garmin GPS-25 here in about a few weeks. Probably
about $10 more then the current 20's.

Cheers - Greg

>Has there been any thought of changing or adding to the group buy to
>make the GPS12-XL available. It is a MUCH better unit. It is 12 channel
>and is MUCH faster and MUCH more accurate. The current unit is really
>ancient technology.
>In addition the current price on the current unit is no longer a
>bargain.
>--
>Gil gbaron@sparc.isl.net
>Bailar es vivir
>http://www.geocities.com/Yosemite/Trails/4168

Greg Jones, WD5IVD
Austin, Texas
wd5ivd@tapr.org
http://www.tapr.org/~wd5ivd

47. [TACGPS:859] Re: GPS group

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Mon, 24 Nov 1997 14:43:37 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <v0311070eb09f93ba0376@[208.134.134.40]>
Rendered body type: text/plain

>The 12-channel parallel OEM rcvr board is the GPS-25. Greg has indicated that
>he hopes to replace the GPS-20 TAPR offering with the -25. I've asked him
>to get me a sample so that we can make sure of its timing characteristics,
>but so far I haven't seen one to "certify".

Still working on getting you one Tom.

Greg

Greg Jones, WD5IVD
Austin, Texas
wd5ivd@tapr.org
http://www.tapr.org/~wd5ivd

48. [TACGPS:860] Re: GPS group

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Mon, 24 Nov 1997 14:45:04 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <v03110710b09f94301f27@[208.134.134.40]>
Rendered body type: text/plain

>I am sorry that I did not realize the purpose of the GPS for this group.
>Nevertheless it would be nice to get a handheld unit for a good price if
>possible. The unit does have a pc interface connection so I assume it
>could be used for all that you want but I do not know that.

I have looked into the same thing. The only real source we have for
handheld units at a price we could do something with for members would be
Garmin. Garmin now has a policy that seems to be against sales over the
Internet (like our GPS web page). The problem is that we use the GPS page
to give full and detail information over time to our member without having
to print it all the time in the PSR....not like we have an Internet store
front. I guess we could do it just through the PSR, but that slows down
how many units you can get out the door up front and thus the price is back
up again.

The numbers just don't look right for TAPR to be doing a group deal with
respect to Handheld units. REI and other store fronts have to good a deal
that we could never meet.

The reason TAPR does OEM boards and RIE does handheld units. TAPR can do
enough OEM boards to its members to make it look good to the OEM
distributors, while the consumer versions we come no where close to the
volume.

The purpose of group purchases within TAPR is to make a few selected items
available to the membership becuase 1) they can not be gotten normally in
single qty or 2) we can get them cheaper even after our overhead added in
---- keep in mind that the item still has to be something that advances
TAPR's mission statement of Educational and R&D related.

I have been amazed how long the window for the GPS OEM boards have been
around. Typically one of these group things works for a year at most and
then just stops.

Anyway, unless something changes in relations to getting handheld units
that would benefit APRS or timing, then I probably keep working on other
things.

Just thought I would throw this in.

Cheers - Greg

Greg Jones, WD5IVD
Austin, Texas
wd5ivd@tapr.org
http://www.tapr.org/~wd5ivd

49. [TACGPS:861] Re: GPS group

From: Dave Martindale <davem@cs.ubc.ca>
Date: Mon, 24 Nov 1997 15:03:40 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <l03102000b09f9a6494f1@[198.162.38.159]>
Rendered body type: text/plain

>I am sorry that I did not realize the purpose of the GPS for this group.
>Nevertheless it would be nice to get a handheld unit for a good price if
>possible. The unit does have a pc interface connection so I assume it
>could be used for all that you want but I do not know that.

The 12XL has NMEA output, so you can use it for APRS position reporting
like almost any other GPS. However, the time in the NMEA data is only
reported to the nearest second, and the NMEA data bursts are *not*
synchronized to the beginning of UTC seconds. There is no way to use
a 12XL or other small Garmin handheld for precision timing.

In contrast, the GPS 20 (and probably the 25, which has the same receiver
as the 12XL) *is* designed for a broader variety of uses, including timing.
The NMEA data is synchronized to the beginning of each second, and there
is a 1 PPS output which provides a pulse synchronized to the beginning
of each second. The 20 is accurate to about 1 us, the 25 might well be
better (judging by the improvement in navigation performance between the
1- and 12-channel Garmin receivers).

I have Garmin 45XL, 12XL, and 20 receivers and have looked at the NMEA
outputs of all of them.

>I am not so sure of that, maybe maybe not. The 12Xl is VERY new.

I bought my 12XL last February, 9 months ago. That makes the 12XL almost
obsolete as consumer GPSes go. I hasn't been replaced in function by
anything else, but I wouldn't be surprised if it was.

>> to get me a sample so that we can make sure of its timing characteristics,
>> but so far I haven't seen one to "certify".

>I can tell you this unit has been certified as among the best in the
>field.

It's a good receiver for navigation, but useless for timing.

        Dave

50. [TACGPS:862] TAPR FTP site

From: "Chandler, Jim" <jchandler@dsatex.com>
Date: Mon, 24 Nov 1997 15:10:00 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <97Nov24.150442cst.26881@texas.dsatex.com>
Rendered body type: text/plain

Thanks Greg,

  That's what I get for not reading the README!!! I'll let you know when
I get the web site populated.

Jim

>Greg Jones, WD5IVD wrote:

>

> Hi.

>

> Just as an update on how the various software upload areas work. When
you

> upload to a TAPR software area, like upload, it is only readable by
whoever

> is responsible for the area. As the README says, you need to send an

> e-mail to that person so they no something needs quick attention --
else it

> might sit a few days. They then move it over to the correct directory once

> they check the file to make sure it is okay.

51. [TACGPS:863] Re: GPS group

From: clark@tomcat.gsfc.nasa.gov (Tom Clark -- W3IWI)
Date: Mon, 24 Nov 1997 15:34:04 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <45244@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Regarding Garmin hand-held units -- let me recommend one source. One of the "good guys" who has always given me a competitive price is Larry James or James Assoc. in Boulder. Larry happens to be KG0GB and is both an AMSAT & TAPR member. Call him at 303-530-9014.

Yes, he will take plastic. He will give you an honest answer on when he will ship to you. Thru the years, I've ordered some 20-30 units from him for colleagues.

73, Tom

52. [TACGPS:864] Re: Results on 58503 measurements

From: "James L. Johnson" <jjjohnson@saiph.hpl.hp.com>
Date: Tue, 25 Nov 1997 11:26:14 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199711251725.JAA13257@saiph.hpl.hp.com>
Rendered body type: text/plain

Tom wrote:
>
> For another data point, the OCXO in the HP 58503A I've been
> using is a 10811-60159. In a conversation with HP last year
> I was told this variation of the standard 10811D OCXO has
> an extended EFC range specification. It enables the 58503
> to continue to be software disciplined, without maintenance,
> in spite of years of oscillator ageing and without requiring
> the user to ever turn a coarse adjustment screw. I have specs
> on the 10811 OCXO family but not the special -60159 model
> so I can't confirm this report but it sounds plausible.
>
> I also recall them saying that the HP 58503A tracks ambient
> temperature and factors that into the control voltage, at
> least during hold-over.
>
> It would be nice, Jim, if you could confirm or elaborate on
> any of this.
>
> Based on my tests, I have to agree with Tom Clark's earlier
> comment about the short-term (1 to 1000 s) stability of
> the HP 58503A. I found it surprisingly poor compared to a
> stand-alone 10811D or other high-end OCXO.
>
> I once remarked to HP that the 58503A must have at least a
> 24-bit DAC and extremely low tempco voltage references in
> order to work unattended for years. The answer I got was:
> no, because of the software PLL it wasn't necessary to have
> extremely precise DACs or voltage references: the control
> voltage is adjusted as necessary regardless whether the
> phase error is the result of oscillator ageing, poor DAC
> or EFC resolution, or ambient temperature effects on the
> analog ICs or the OCXO. Interesting.
>
> I have a number of 10811 or equivalent OCXO's and after
> running for months or years many of them have ageing rates
> one or two orders of magnitude below their 5e-10 spec. But
> a typical tempco for these is 2.5e-9 for 0 to 50 C which
> (assuming linear) is 5e-11/C. Since I often see a 10 C
> temperature change in my lab (garage), this net 5e-10 daily
> temperature-induced error *totally* dominates the medium
> term (1000 to 100000 s) stability of these references.
>
> /tvb

Hi Tom,

The -60159 version of the HP 10811 oscillator is one that has had its EFC tuning circuit "enhanced". The factory sets the coarse tuning adjustment for 10 MHz, after which it needs no further adjustment for the life of the product. The improved EFC tuning circuit has the range to tune the oscillator frequency to compensate for crystal aging and environmental effects.

The 58503 does indeed track the ambient temperature and apply a correction to the control voltage. This is a first-order, open loop correction used to enhance the performance of the unit under the condition of widely varying ambient temperatures.

Our tests of the 58503 found that it does meet its specifications, but it is true that for averaging times longer than a few ten's of seconds, the SA on the GPS signal does cause the 58503's Allan variance to be higher than that of a stand-alone OCXO. But this would be true for any high quality crystal oscillator that is being disciplined in the long-term by a noisy, but stable reference.

I'm not sure what I can add to the answer you got from HP about not needing precision DACs or voltage references to work unattended for years. I agree with that answer - if the oscillator is locked up to GPS, then in the long-term it should be disciplined to UTC(USNO) regardless of any oscillator characteristics or environmental conditions that try to steer it off frequency. The control loop will pull it back to UTC(USNO) if it tries to drift off for any reason.

You're absolutely right about local environmental effects dominating the medium-term performance of free-running precision (those with low aging and close-in phase noise) oscillators. We see the same problem.

Sorry this took so long but I hope it answers some of your questions.

73,

Jim W6SC
jjohnson@hpl.hp.com

53. [TACGPS:865] GPS group

From: mikebw@bilow.bilow.uu.ids.net (Mike Bilow)
Date: Tue, 25 Nov 1997 14:18:41 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <47aecfe5@bilow.bilow.uu.ids.net>
Rendered body type: text/plain

Gilbert Baron wrote in a message to Mike Bilow:

> GB> Has there been any thought of changing or adding to the group
> GB> buy to make the GPS12-XL available. It is a MUCH better unit.
> GB> It is 12 channel and is MUCH faster and MUCH more accurate. The
> GB> current unit is really ancient technology.

I have recently been using the newer MultiTrac 12 engine, instead of the old PhaseTrac 8 engine. I agree that it is far better.

Side by side, my GPS-38 (with the old engine) and my GPS-12 (with the new engine) leave almost no comparison. I will consistently get twice as many satellites, and, what is more important, will tend to add the satellites closest to the horizon which provide the greatest (positioning) accuracy. It is common for the 38 to show EPE of 200-300 feet, while the 12 generally shows EPE of 50-80 feet. Inside a wooden house, the 38 usually sees no satellites, but the 12 sees about as many satellites as the 38 would see outside.

Initializing from cold start is also much improved on the new engine. The 38 could take 20-60 minutes to do a cold start and about 5 minutes for a warm start, but the 12 cold starts in about 1-2 minutes and warm starts instantly. I was quite pleasantly surprised.

> GB> In addition the current price on the current unit is no longer
> GB> a bargain.

I can't speak to that, but certainly complete GPS-12 units with keyboard and LCD display are selling at street prices in the $150-175 range. I know that Garmin typically charges a lot more for their OEM (bare) units, though.

Of course, I don't know anything about the innards of the 12, but I assume it must somehow be able to provide the 1 PPS signal. This is not brought out of

the case on the 12, but neither is it brought out of the case on the 38, and
the 38 uses the same engine as in the TAPR GPS-20 buy. I think the OEM version
of the 12 engine is the GPS-25, but I am not sure of that; Tom or Greg will
probably have better information.

-- Mike

54. [TACGPS:866] Re: GPS group

From: mikebw@bilow.bilow.uu.ids.net (Mike Bilow)
Date: Tue, 25 Nov 1997 14:19:05 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <47aecfe6@bilow.bilow.uu.ids.net>
Rendered body type: text/plain

Gilbert Baron wrote in a message to Mike Bilow:

 GB> I can tell you this unit has been certified as among the best
 GB> in the field. Navagation is my only interest in GPS so perhaps
 GB> I am at the wrong place. I was only hoping that I could get my
 GB> GPS before the summer hiking and conoeing starts at a good
 GB> price. I see that this is probably not the place and after
 GB> seeing what activity is here I will probably unsubscribe.
 GB> Thanks for the information.

This is a fairly low traffic list, and my own opinion is that the technical
issues of comparing the equipment are probably appropriate here. However, you
have fallen in with a bunch of people whose primary interest is in cutting the
units open and experimenting with them! Seriously, I don't think TAPR cares
what you do with your unit, but non-navigational issues, especially precise
timing, have been the focus of this list.

If your main interest is navigation, then you are probably better off buying a
unit off the shelf from any of the commercial suppliers. Wal-Mart sells the
GPS-12 handheld unit around here for $164. Several mail order dealers who
specialize in GPS equipment have Internet sites, including James Associates
("http://www.csn.net/~lwjames/index.html"), which sells the GPS-12 at $160.
Note that the GPS-12 is not the same as the more expensive GPS-12XL (although
they use the same engine), but I doubt you would notice the difference for
hiking and canoeing.

-- Mike

55. [TACGPS:867] Searchable file?

From: John Franke <j.m.franke@larc.nasa.gov>
Date: Tue, 25 Nov 1997 14:58:36 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <v03020900b0a0eb7e2b5e@[128.155.59.12]>
Rendered body type: text/plain

Is there a searchable log or file for this SIG? If so, where is it and how
does one, or more, access it?
John

56. [TACGPS:868] Re: Results on 58503 measurements

From: Brooks Shera <ebs@lanl.gov>
Date: Tue, 25 Nov 1997 15:10:37 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199711252108.OAA13811@newreg.lanl.gov>
Rendered body type: text/plain

Hi Jim

I found your comments and measurements on the 58503 very interesting,
especially the fact the that unit includes a temperature sensor to
make first order ambient corrections.

However I disagree about one point you raise.

>   Our tests of the 58503 found that it does meet its specifications,
>but it is true that for averaging times longer than a few ten's of
>seconds, the SA on the GPS signal does cause the 58503's Allan variance
>to be higher than that of a stand-alone OCXO. But this would be true
>for any high quality crystal oscillator that is being disciplined in the
>long-term by a noisy, but stable reference.

I believe this is true only if the disciplining circuit has inappropriate
(or no) filtering. For optimum performance the output frequency should be
controlled by the OCXO in the short term and GPS in the longer term.

An analogy is the calendar and the wristwatch. My calendar, like GPS,
is accurate in the long term, but I don't continually reset my
wristwatch by it.

An appropriately long filter time constant insures that a good wristwatch
is not reset when its error is less than the clock used to reset it.

Someday, hopefully, the DoD will cause SA to go away and we can use
shorter disciplining time constants. Maybe the 58503 design is just
anticipating the future.

Thanks for your interesting comments.

-Brooks

57. [TACGPS:869] Re: Searchable file?

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Wed, 26 Nov 1997 11:34:09 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <347C5C62.10C@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

John Franke wrote:
>
> Is there a searchable log or file for this SIG? If so, where is it and how
> does one, or more, access it?
> John

In a sense, the precursor to TACGPS was my gps-timing exploder. It
still exists but has been very inactive of late. The old historical
archives can be viewed by setting a newsreader to

   news://aleph.gsfc.nasa.gov

and then subscribing to gps-timing. The other news groups on aleph are
browsable but uninteresting -- they relate to my VLBI project here in
NASA.

Of particular interest in the aleph archives are a series of messages
involving Dave Mills (Professor xntpd -- the network timing daemon),
Louie Makamos, Doug Hogarth (who wrote the TAC-compatible NTP code for
Windows NT) et al which discuss things that could/should/might/need to/
be done to properly use GPS for network timing applications.

73, Tom

58. [TACGPS:871] One serial line driving two serial ports?

From: John Ackermann N8UR <jra@febo.com>
Date: Fri, 28 Nov 1997 07:41:05 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199711281401.JAA14007@meow.febo.com.>
Rendered body type: text/plain

This may be a dumb question, but...

I'd sometimes like to run two GPS programs on my PC at the same time (for
example, TAC32 and SA Watch). I have enough serial ports available to let
each program have its own. For logistical reasons, I can't use the second
serial output on the TAC to drive the second application -- I need to figure
out how to make the Port 1 output drive both applications.

Is there a simple kludge to allow a single serial line to be "Y"d into two
ports? I don't think that either application talks to the GPS unit after
initialization, so all I really need to do is split the GPS output signals in
two. Is a passive splitter good enough, or do I need to either isolate the
two serial ports from each other, or provide more drive, or both?

John N8UR
jra@febo.com

59. [TACGPS:872] RE: One serial line driving two serial ports?

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Fri, 28 Nov 1997 10:21:23 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <01BCFBEF.49551700@rick.cnssys.com>
Rendered body type: multipart/mixed

[No readable text body. See the preserved original monthly archive.]
[Inline non-text content: multipart/mixed; 1,463 bytes]

60. [TACGPS:873] Re: One serial line driving two serial ports?

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Fri, 28 Nov 1997 11:51:09 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <347F0322.194A@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

John Ackermann N8UR wrote:
>
> This may be a dumb question, but...
>
> I'd sometimes like to run two GPS programs on my PC at the same time (for
> example, TAC32 and SA Watch). I have enough serial ports available to let
> each program have its own. For logistical reasons, I can't use the second
> serial output on the TAC to drive the second application -- I need to figure
> out how to make the Port 1 output drive both applications.
>
> Is there a simple kludge to allow a single serial line to be "Y"d into two
> ports? I don't think that either application talks to the GPS unit after
> initialization, so all I really need to do is split the GPS output signals in
> two. Is a passive splitter good enough, or do I need to either isolate the
> two serial ports from each other, or provide more drive, or both?

John -- this is PRECISELY one of the reasons that the TAC-2 is a bit
more
complicated than an absolutely minimalist board might have been! The
TAC-2
has two independent serial ports #1 & #2 -- Port #1 is dubbed"prime" and
#2
is "secondary" (except for the specail case of a dual-port rcvr like the
Trimble SK-8).

Both ports have the same serial output data and RS232 1PPS signals going
from
the TAC-2, driven by the MAX232 U2.

On the computer-to-TAC2 input side, the ports have independent RS232
receivers
(Port #1 = MAX232 and Port #2 = U1A) which are ORed together in U1B.
Input into
Port #2 is muted (squelched) whenever Port #1 data is present. This
"squelch"
has a "squelch tail" of about 0.1 seconds set by R1*C1.

The original primary intent of this was so that a computer running
SHOWTIME
or TAC32 connected to Port #1 could have guaranteed control over the
receiver
for setting up operating conditions, while a lower priority DGPS beacon
rcvr
connected to Port #2 could be sending DGPS corrections.

Since you suggest TAC32 and SAWATCH are the 2 programs you want to use,
you
need to be sure that they are both running at the same baud rate. Since
SAWATCH requires 4800 baud NMEA data (on Port #2), TAC32 must be running
in MOT NMEA mode on Port #1.

So all you need is an additional 10-pin IDC header to 9-pin RS232 cable
to
do what you want.

73, Tom

61. [TACGPS:874] GPS display 1.5 web site

From: "Chandler, Jim" <jchandler@dsatex.com>
Date: Sat, 29 Nov 1997 11:10:43 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <97Nov29.110749cst.26881@texas.dsatex.com>
Rendered body type: text/plain

I have created a web site for the GPS display program. It is
http://www.flash.net/~jchandle You will always be able to download the
latest version there. I will send it to the TAPR ftp site shortly.

BTW, does anyone else have problems sending email to the tacgps group and
it never shows up?

Jim, N0VH

jchandle@flash.net

December 1997

Original source file: tacgps.9712
Source: http://ftp.tapr.org/product_docs/TAC2/mail_archives/tacgps.9712

1. [TACGPS:876] HP 58503 response

From: "James L. Johnson" <jjjohnson@saiph.hpl.hp.com>
Date: Mon, 1 Dec 1997 17:45:15 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199712012344.PAA17309@saiph.hpl.hp.com>
Rendered body type: text/plain

Brooks Shera wrote:

However I disagree about one point you raise.

>   Our tests of the 58503 found that it does meet its specifications,
>but it is true that for averaging times longer than a few ten's of
>seconds, the SA on the GPS signal does cause the 58503's Allan variance
>to be higher than that of a stand-alone OCXO. But this would be true
>for any high quality crystal oscillator that is being disciplined in the
>long-term by a noisy, but stable reference.

I believe this is true only if the disciplining circuit has inappropriate
(or no) filtering. For optimum performance the output frequency should be
controlled by the OCXO in the short term and GPS in the longer term.

Someday, hopefully, the DoD will cause SA to go away and we can use
shorter disciplining time constants. Maybe the 58503 design is just
anticipating the future.

Thanks for your interesting comments.

-Brooks

Hi Brooks,

   The disciplining loop that would optimize the noise level at all
averaging times, with the best OCXO, is not always the most practical in
a multi-purpose instrument. Real oscillators present a few problems
such as sensitivity to temperature, humidity, vibration, and
acceleration. Many also show frequency "jumps", especially with newly
manufactured quartz resonators. These events may not be important all
the time, but the loop must be fast enough to keep the resulting time
run-out within specification.

   With SA on, the performance picture is somewhat clouded by all of
these effects in the range of averaging times from a few seconds to over
100 seconds. The 58503 may not be ideal, but its design intends to
minimize as many of these effects as possible. The short term
performance is determined by the OCXO and the long term by GPS. The
medium term is where the compromises are made in order to contend with
SA and the environmental instabilities that show up in undisciplined
OCXOs. It certainly would be nice to have SA disappear so that the GPS
signal could reduce environmental effects by utilizing even faster
disciplining loops. For now, the non-ideal SA filtering in the 58503 is
able to reduce the environmental effects to some extent, maintain the
long and short term performance, while compromising slightly in the
medium term Allan variance.

   Thanks for your comments on the product - I'm learning a lot about
it myself!

   73,

   Jim W6SC
   jjohnson@hpl.hp.com

2. [TACGPS:877] SHOWTIME question

From: trcox@worldnet.att.net (Tom Cox)
Date: Tue, 2 Dec 1997 22:24:48 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <v01530500b0aa887f5019@[12.66.33.199]>
Rendered body type: text/plain

I'm trying to run SHOWTIME v. 3.34 with a TAC-2 that contains a Garmin GPS-20.

I get the initial oscilloscope display of 1pps beeps, then the following:

```
        Init @ 4800   @ 9600
        .
        Device I/O error in line 1 of module SHWTM33d at address 15FA:0696
        Hit any key to return to system
```

I'm wondering about the "@ 9600" since the GPS-20 communicates only at 4800
bps in this configuration.

3. [TACGPS:878] Re: SHOWTIME question

From: clark@tomcat.gsfc.nasa.gov
Date: Tue, 2 Dec 1997 23:00:02 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <45864@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Apparently

4. [TACGPS:879] Re: SHOWTIME question

From: clark@tomcat.gsfc.nasa.gov
Date: Tue, 2 Dec 1997 23:01:42 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <45871@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

(Sorry for the bogus message justr sent!)

You must not have used the GARMIN.GPS "seed" file -- the @9600 applies
to the Motorola rcvr. In the *.GPS file you are using, set APTYPE 5 so
that it knows for sure that it is a Garmin rcvr. I tried to build in
automatic recognition but that only works AFTER it has seen some data
from the rcvr.

Tom

5. [TACGPS:880] Re: Antenna cables.

From: "Henk Uijterwaal (RIPE-NCC)" <henk@ripe.net>
Date: Wed, 3 Dec 1997 04:14:41 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <Pine.SUN.3.95.971203110059.16089E-100000@ncc.ripe.net>
Rendered body type: text/plain

On Thu, 20 Nov 1997, Mike Bilow wrote:

> > There are already cables running from the computerroom to the roof.
> I cannot think of any good reason why 75 ohm coax would be run for computer
> networking purposes, neither for Ethernet (50 ohm) nor ARCnet or SNA (93 ohm).

Well, I have no idea either why these cables are there. OTOH, it is an
university computer center so I guess that they have used a decent quality
cable. The place is 1500 miles away, so it is not so easy to drive over
and look at the cables myself.

> TC-W> My best advice is to try it.
> No one could argue with that advice, certainly.

Since it doesn't sound completely hopeless, this is what we're going to
do. I'll keep the list posted on any developments.

Henk


```
--------------------------------------------------------------------------------
Henk Uijterwaal                    Email: henk.uijterwaal@ripe.net
RIPE Network Coordination Centre     WWW: http://www.ripe.net/home/henk
Singel 258                         Phone: +31.20.535-4414,  Fax -4445
1016 AB Amsterdam                   Home: +31.20.6651962
The Netherlands                    Pager: +6.57626855
--------------------------------------------------------------------------------
```


%DCL-E-NOCFFE, unable to locate coffee - keyboard input suspended.

6. [TACGPS:881] RE: TAC32

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Thu, 4 Dec 1997 06:23:32 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <01BD0084.EFF5FA40@rick.cnssys.com>

Rendered body type: text/plain

Don,

Thanks for the suggestion. I have taken your suggestion as a wake-up call to solve a long standing problem with the COM port list. I have finally solved the problem of automatically detecting all the available COM ports on a machine so the list reflects the actual COM ports that are available, regardless of their configuration, even if they are in use by other programs.

This improvement is now part of the new version which is being readied for release very soon. This will be a major release including all of the currently missing functionality so that TAC32 will do everything Showtime does, and more.

Rick
WB2TNL

-----Original Message-----
From: Donald E. Haselwood [SMTP:k4jpj@appstate.campus.mci.net]
Sent: Sunday, November 30, 1997 11:13 PM
To: Richard M. Hambly
Subject: TAC32

Richard,

Nice program. If you are tweaking the code, I would suggest extending the comport selection to 15 (max allowed). I have an add-on board which gives me 4 ports on top of the 2 on the motherboard, (on top of the 1 for modem), so I can go to COM7.

73's
Don, W4DH

7. [TACGPS:882] Re: SHOWTIME question

From: K4ITV <K4ITV@aol.com>
Date: Sat, 6 Dec 1997 15:08:43 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <16bc65a9.3489bb88@aol.com>
Rendered body type: text/plain

Sir, this has nothing to do with this msg but just trying to find out how I post a message to the TAG. I purchased the gps30pc special from TAPR and am happy with what I received. Big problem is trying to interface it to APRS , gpc stand-alone and a Kantronics KPC-3 Plus. I had it working then tried to refine & oops. Kantronics does not know as much as I do about this problem so could you point me to someone that might help?? 73 and a very MERRY CHRISTMAS

de Charlie, K4ITV

8. [TACGPS:883] Re: SHOWTIME question

From: clark@tomcat.gsfc.nasa.gov
Date: Sat, 6 Dec 1997 15:54:43 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <46335@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

My advice would be to post the question on APRSSIG!

Tom

9. [TACGPS:884] TAC-2 assembly questions

From: Jeremy Bishop <jeremyb@canb.auug.org.au>
Date: Sat, 6 Dec 1997 19:52:11 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199712070147.MAA18471@pcug.org.au>
Rendered body type: text/plain

First of all, hallo to Tom, Rick and others that I met at the TAPR/ARRL DCC conference back in October. Now that I'm back in Australia, I am about to assemble my TAC-2 (using the Motorola Oncore VP receiver). I have a few questions ...

WARNING - software engineer asking dumb hardware questions ... please make allowances :-)

I will be using the Lowe Electronic's active GPS antenna with LNA (see http://www.lowe.co.uk/gpsant.html). The antenna is supplied with 5m of RG-174 equivalent coax cable but I will need to extend this. Can I use any 50 ohm coax, or does it need to be RG-174 or equivalent?

Secondly, the TAC-2 kit has an option for antenna pre-amplifier power.
Do I need to use this for the Lowe antenna? My reading of the Oncore
documentation is no, since the Oncore apparently supplies 5v to the
antenna connector. Under what circumstances, or for what boards, is
there a need for the TAC-2 antenna pre-amp option?

Also, I note that the Oncore antenna power is spec'ed at 25mA at 5v,
but the Lowe antenna power consumption is quoted as 32mA (at room
temperature). Is this going to be OK?

For the TAC-2 power supply, I will be using the PowerTrends PT5101
switching regulator. I note that installation of the 7805 regulator
supplied with the kit says to install the centre (ground) pin to 'Z'.
Is this needed for the PT5101 as well or should the centre pin go to
the "obvious" hole?

Page 13: Installation of the Oncore VP - Is the wording correct - don't
you mean cut the trace from the pin 1 (N) to pin 2 (centre), and install
the jumper from pin 3 (I) to pin 2?

I'd appreciate any other tips that people might have on assembling the
TAC-2 in the configuration I've described.

Thanks,
Jeremy

--
Jeremy Bishop
jeremyb@canb.auug.org.au
Australian Unix User Group (AUUG) Canberra Chapter

10. [TACGPS:885] Re: TAC-2 assembly questions

From: chrise@n0jcf.com (Chris Elmquist)
Date: Sat, 6 Dec 1997 20:34:24 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <m0xeWQt-000UO1C@n0jcf.com>
Rendered body type: text/plain

Jeremy Bishop wrote:
> I will be using the Lowe Electronic's active GPS antenna with LNA (see
> http://www.lowe.co.uk/gpsant.html). The antenna is supplied with 5m of
> RG-174 equivalent coax cable but I will need to extend this. Can I use
> any 50 ohm coax, or does it need to be RG-174 or equivalent?

I can comment on this portion of your questions--

I too am using the Lowe antenna with a GPS-20 module. I extended
the feedline some 50' using RG-6 quad shield CATV coax (that'd be
75 ohm and cheap). Works like a charm. I crimped the standard issue
F-type connectors onto the coax and then used F to BNC adapters on
each end to mate with the antenna and the BNC I put on the box that
the GPS-20 is in. Getting great SNR numbers on every bird it sees.
Can't complain.

And now that I've finally got xntpd on Linux listening to the GPS--
I'm complaining even less !

73, Chris

--
Chris Elmquist, N0JCF
chrise@n0jcf.com
n0jcf@amsat.org

11. [TACGPS:886] Re: TAC-2 assembly questions

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Sat, 6 Dec 1997 21:33:59 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <348A1900.4891@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Jeremy Bishop wrote:
>
> First of all, hallo to Tom, Rick and others that I met at the TAPR/ARRL
> DCC conference back in October. Now that I'm back in Australia, I am
> about to assemble my TAC-2 (using the Motorola Oncore VP receiver). I
> have a few questions ...

Glad we had the chance to meet. Hope it was worth your blowing a day to
come see some of the things these crazy amateurs arer doing!

> WARNING - software engineer asking dumb hardware questions ... please
> make allowances :-)

OIK -- just hope you know which end of the soldering iron to pick up ;<}

> I will be using the Lowe Electronic's active GPS antenna with LNA (see
> http://www.lowe.co.uk/gpsant.html). The antenna is supplied with 5m of
> RG-174 equivalent coax cable but I will need to extend this. Can I use
> any 50 ohm coax, or does it need to be RG-174 or equivalent?

You probably do not want to use RG174! It has the advantage that it is
small and flexible, but it is lossy as hell!

Don't know the Lowe antenna -- never saw one, but the picture on their
web sit is pretty. It looks pretty much like a generic GPS antenna.

> Secondly, the TAC-2 kit has an option for antenna pre-amplifier power.
> Do I need to use this for the Lowe antenna? My reading of the Oncore
> documentation is no, since the Oncore apparently supplies 5v to the
> antenna connector. Under what circumstances, or for what boards, is
> there a need for the TAC-2 antenna pre-amp option?

The ONCORE rcvr put out 5V for the antenna on its power connector.
The Ext Antenna Power option on the TAC-2 is intended for a few,
specialized professional applications. For example, SOME antennas
require 12V bias. In that case, you'd install a DC bias block in the
antenna lead to disable the rcvr's internal +5VDC bias and then use
the bias block to send +12v out to the antenna.

In my original TACs, I had a small MMIC amplifier on the circuit
board. That design re-biased the antenna with a separate supply.
The combination of the MMIC and the re-biasing had the side benefit
of serving as an RF fuse to provide some small measure of protection
for the GPS rcvr in case the antenna got hit by lightning or (as
actually happened) to protect the the TAC's GPS rcvr when the PDU
(Poor Dumb User) inadvertently fed +12v into the antenna connector.

> Also, I note that the Oncore antenna power is spec'ed at 25mA at 5v,
> but the Lowe antenna power consumption is quoted as 32mA (at room
> temperature). Is this going to be OK?

Don't worry -- the only limitation is on the current handling
capability of the RF choke in the ONCORE -- it has been used at
50 ma load with no ill effects.

> For the TAC-2 power supply, I will be using the PowerTrends PT5101
> switching regulator. I note that installation of the 7805 regulator
> supplied with the kit says to install the centre (ground) pin to 'Z'.
> Is this needed for the PT5101 as well or should the centre pin go to
> the "obvious" hole?

For the PT5101, use the 3 inline holes -- not the staggered "Z" hole.
The 5101 will just drop in place with no surgery needed on its leads.
If you did use "Z" it would make no difference since "Z" is shunted
to ground at R11. You have to cut this jumper if you want to use R11
along with a conventional 7805 to tweak the +5V supply voltage.
Sorry that the instructions weren't clearer.

> Page 13: Installation of the Oncore VP - Is the wording correct - don't
> you mean cut the trace from the pin 1 (N) to pin 2 (centre), and install
> the jumper from pin 3 (I) to pin 2?

That one got screwed up and should be fixed the next time the
instructions
are printed. The ONCORE VP uses the "I" (inverted) connection, while the
Garmin and older ONCORE BASIC use the (default) "N" non-inverting
position.

The situation (as well as all the other jumper options) is made more
clear
on my Drawing Page 5. Unfortunately this didn't make it into the initial
TAPR distribution package either. I'd suggest that you pick up the
complete,
correct set of drawings from my FTP site at URL

ftp://aleph.gsfc.nasa.gov/GPS/tac2/

where you will find 2 versions -- dwg2c-lj.zip and dwg2c-ps.zip -- the
former
is some .prn files that print directly on a HP LaserJet 3/4/5/6 (the
better
choice) while the latter contains PostScript versions of the drawings.

> I'd appreciate any other tips that people might have on assembling the
> TAC-2 in the configuration I've described.
>
> Thanks,
> Jeremy

It's been pretty bullet-proof out of the box except for the jumper
confusion
and software gitches.

73 (that's ham radio talk -- you really should get a license!!) -- Tom

12. [TACGPS:887] Travelling

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Sat, 6 Dec 1997 21:40:27 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <348A19D9.18BD@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

I'll be away this next week, attending the American Geophysical Union
meeting in San Francisco. Next weekend I'm returning via Toronto to
participate in an AMSAT design review of a Univ. of Toronto small
satellite. Don't expect rapid responses to Email!

73, Tom

13. [TACGPS:888] Book on Precise Timing

From: "Steven R. Bible" <srbible@gate.net>
Date: Sun, 7 Dec 1997 10:31:23 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19971207112724.007df100@pop.gate.net>
Rendered body type: text/plain

I thought folks on the list might be interersted. I found this at the
Navtech Web site

    http://www.navtechgps.com/book16.htm

Handbook - Selection and Use of Precise Frequency and Time Systems,
International Telecommunication Union (ITU),1997. The ability to obtain
high timing accuracy at a low cast has improved vastly over the last ten
years, primarily due to satellite techniques, including GPS. The goal of
this handbook is to provide guidance in terms of source selection and
proper utilization, for both experienced and novice users of precise
timing, in order to assist them in meeting their specific timing needs. 191
pages, softcover (#2432) $61.00

Has anyone read this book?

 - Steve, N7HPR
 (n7hpr@tapr.org)

14. [TACGPS:889] XNTPD?

From: Pieter Swanevelder <fskps@pukfsk.puk.ac.za>
Date: Tue, 9 Dec 1997 09:33:53 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <348BDCB1.402C92C5@pukfsk.puk.ac.za>
Rendered body type: text/plain

Chris Elmquist wrote:
> And now that I've finally got xntpd on Linux listening to the GPS--
>

Sorry to butt in (new on the group), but can someone point
me to a source for xntpd and related LINUX software? Much
appreciated.

Regards,
--

Pieter Swanevelder
mailto:fskps@pukfsk.puk.ac.za http://home.intekom.com/sanae

15. [TACGPS:890] Requirements for GPS antenna 200 feet from RX?

From: John Ackermann N8UR <jra@febo.com>
Date: Tue, 9 Dec 1997 13:29:19 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199712091923.OAA30141@meow.febo.com.>
Rendered body type: text/plain

This may be a bit off-topic for this list, but I'm pretty sure the guys
can answer this question are here (Tom, in particular!).

We're looking at building up a "super-APRS" facility at our main
packet/repeater site here in Dayton. Looking a bit toward the future,
I'd like to offer DGPS service if'/when the software becomes available
to do that.

However, the only place we can get a clear shot of the sky in all
directions is from the top of the water tank (aka "Dayton Mountain")
where our VHF antennas, and lots of commercial/gov't stuff, are
mounted. This raises 2 questions:

1. The feedline run will be 200+ feet. We can run 9913 or 3/4 inch
CATV hardline if necessary, but I wonder if anyone has suggestions
about antennas and preamp strategies for a run that long.

2. There'll be lots of RF (mainly VHF and UHF) up there. The GPS
receiver will be a Motorola Oncore. Any suggestions on antennas or
filters we might need to have the preamps and receiver work properly in
such an environment?

Thanks,

John N8UR
jra@febo.com

16. [TACGPS:891] XNTPD?

From: mikebw@bilow.bilow.uu.ids.net (Mike Bilow)
Date: Tue, 9 Dec 1997 22:47:21 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <48dd8c22@bilow.bilow.uu.ids.net>
Rendered body type: text/plain

Pieter Swanevelder wrote in a message to Mike Bilow:

> And now that I've finally got xntpd on Linux listening to the GPS--

 PS> Sorry to butt in (new on the group), but can someone point me
 PS> to a source for xntpd and related LINUX software? Much
 PS> appreciated.

Start with the NTP Home Page, "http://www.eecis.udel.edu/~ntp/", which links to
the distribution at "ftp://ftp.udel.edu/pub/ntp/xntp3-5.91.tar.gz".

Getting NTP running is one of the easiest builds I've ever done of that size on
Linux. You pretty much untar it, run the "configure" script, run "make", run
"make install", and out comes a running system. Of course, you have to define
your peers manually in "/etc/ntp.conf" and it is a good idea to define a
driftfile there also (I use "/etc/ntp.drift" for the sake of consistency), but
you can't expect everything to be automatic.

I have not yet integrated NTP with the TAC-2 through a reference clock driver,
and it would be helpful if someone could post the necessary configuration
files. There are several options, such as the 'ATOM' (PPS) driver, that would
work although probably not optimally. The 'NMEA' driver also looks like a
choice, although that might throw away some accuracy.

-- Mike

17. [TACGPS:892] Re: XNTPD?

From: Randolph Bentson <bentson@grieg.holmsjoen.com>
Date: Wed, 10 Dec 1997 01:31:04 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199712100729.XAA02611@grieg.holmsjoen.com>
Rendered body type: text/plain

Mike Bilow <mikebw@bilow.bilow.uu.ids.net> wrote:
> Getting NTP running is one of the easiest builds I've ever done
> of that size on Linux.
..
> I have not yet integrated NTP with the TAC-2 through a reference
> clock driver, and it would be helpful if someone could post the
> necessary configuration files. There are several options, such
> as the 'ATOM' (PPS) driver, that would work although probably
> not optimally. The 'NMEA' driver also looks like a choice,
> although that might throw away some accuracy.

I've got both NMEA and ATOM running on my Linux system. The
former was no problem, but the signal is noisy. It has about
250 ms jitter which makes a mess of really fine tuning the
clock.

To get the ATOM clock running, I added patches from Ulrich Windl
to both the kernel and xntpd code. You can fetch the latest from
ftp://pcphy4.physik.uni-regensburg.de/pub/wiu09524/PPS/, but
note that it may not fit with 2.0.32 or 2.1.71 because some of
the patches have already made it into the kernel.

I had trouble with this at first because I tried to avoid problems
with the noisy NMEA clock. I set it to a lower stratum with the
intention of relying on stratum 1 clocks for the initial setting.
I finally found the code which says the ATOM doesn't start until
the corresponding clock (at the same stratum) has made the cut.
Once I set both NMEA and ATOM to stratum 0 (or rather, let the
default stratum 0 alone) everything looked much better. In the
config file below, sibelius is running a bare NMEA clock and
bigben and utcnist are stratum 1 derived from .USNO. and .ACTS.
respectively.

It's funny how now I worry when the offset on the clock gets
near a millisecond. :-) See
    http://www.aa.net/~bentson/clock22.ps
for a sense of how the offset changes for this clock.

One of my side projects is figuring out how to turn the NMEA
into a more stable source. Clearly some central value is better
than following the jumps introduced by (I suppose) how the
sentences are issued by the GPS engine. At the moment, it looks
like I'd need to take the simple mean of 200+ points, but I
hope some analysis will show a better filter. See
    http://www.aa.net/~bentson/clock20.ps
for a sense of how the offset changes for this clock.

Randolph Bentson
bentson@grieg.seaslug.org
http://www.ssc.com/ssc/insidelinux

##################### /etc/ntp.conf   ############################
```
driftfile       /etc/ntp.drift
keys            /etc/ntp.keys
#trustedkey 1 2 5
requestkey xxxx
controlkey xxxx

statsdir        /tmp/
filegen loopstats file loopstats type day enable
filegen peerstats file peerstats type day enable
filegen clockstats file clockstats type day enable

server 127.127.1.0              # local refclock
fudge 127.127.1.0 stratum 7

server 127.127.22.0  prefer   # ATOM(PPS)

server 127.127.20.0  prefer    # local refclock  GPS
fudge 127.127.20.0 time1 0.240 #
# I don't think the following line is needed for NMEA
# source, but I haven't yet tried running without.
fudge 127.127.20.0 flag3 1    # enable PPS processing (for ATOM)
```

```
########## local peers ############
peer sibelius.holmsjoen.com

###  REMOTE SERVERS (in neighborhood) ###
server bigben.cac.washington.edu
server utcnist.microsoft.com
#####################################################################
```

18. [TACGPS:894] Re: TACGPS digest 98

From: Phil Reed <pcr@ic.net>
Date: Wed, 10 Dec 1997 20:48:36 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19971210191420.030b03d8@ic.net>
Rendered body type: text/plain

```
>1.  The feedline run will be 200+ feet.  We can run 9913 or 3/4 inch
>CATV hardline if necessary, but I wonder if anyone has suggestions
>about antennas and preamp strategies for a run that long.

Simple. Don't run the antenna. Run the data. It's a lot easier to
set up RS-232 for a long distance run. Line drivers are cheap and
powerful, and the wire is a lot less expensive.


                                        ...phil / kb8uoy
```

19. [TACGPS:895] Requirements for GPS antenna 200 feet from RX?

From: Darryl Smith <vk2tds@ozemail.com.au>
Date: Thu, 11 Dec 1997 02:53:52 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <348FA93D.AEEF5DF1@ozemail.com.au>
Rendered body type: text/plain

```
OK - I have done little RF engineering, but my microwave lecturer at uni did have 2
IEEE medals...

My suggestions would be to use as little length as possible, use as expensive cable
as possible and not to use broad band pre-amps...

If you insist on using a pre-amp make sure it has a pass band for the GPS
frequencies. Remeber the problems with TVI to a house with a mast head amp. Those
problems do not go away with spread spectrum. If at all possible have a data signal
coming down rather than an RF one.

Also, I have heard of a technique used here for phones - and I am not sure it
really exists.. I have told they have been using a cell site in the telephone
exhange, modulating a signal onto a fibre optic cable and demodulating at the other
end. This might be more feasable - and then the distance would not matter...

Darryl SMith
VK2TDS@Ozemail.com.au
```

20. [TACGPS:896] Re: TACGPS digest 98

From: John Ackermann N8UR <jra@febo.com>
Date: Thu, 11 Dec 1997 07:03:39 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199712111246.HAA00415@meow.febo.com.>
Rendered body type: text/plain

```
> >1.  The feedline run will be 200+ feet.  We can run 9913 or 3/4 inch
> >CATV hardline if necessary, but I wonder if anyone has suggestions
> >about antennas and preamp strategies for a run that long.
>
> Simple. Don't run the antenna. Run the data. It's a lot easier to
> set up RS-232 for a long distance run. Line drivers are cheap and
> powerful, and the wire is a lot less expensive.
>
>
>                                        ...phil / kb8uoy

Good idea, but the site is quite difficult to get to and I'd rather
have the radio somewhere where it is both a bit more protected, and can
be banged on if necessary.  Having a preamp up there (which I'm sure
will be a requirement) is bad enough...

John
```

21. [TACGPS:897] TAC32 Version 1.1.0 is available

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Fri, 12 Dec 1997 18:41:50 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <01BD0735.77CC9800@rick.cnssys.com>
Rendered body type: multipart/mixed

[No readable text body. See the preserved original monthly archive.]
[Inline non-text content: multipart/mixed; 2,120 bytes]

22. [TACGPS:898] Re: XNTPD?

From: RHS Linux User <tapr@k4ziv.erols.com>
Date: Fri, 12 Dec 1997 21:41:25 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <Pine.LNX.3.95.971212221519.23506A-100000@k4ziv.erols.com>
Rendered body type: text/plain

```
Randolph Bentson wrote:
<To get the ATOM clock running, I added patches from Ulrich Windl
<to both the kernel and xntpd code.  You can fetch the latest from
<ftp://pcphy4.physik.uni-regensburg.de/pub/wiu09524/PPS/, but
<note that it may not fit with 2.0.32 or 2.1.71 because some of
<the patches have already made it into the kernel.

I downloaded the above mentioned patchkit. The latest was
ppskit-0.3.4.tar.gz.
I am running 2.0.32 kernel which it has an updated patch for, that
seemed to do fine, the kernel seems to have the pps function now.
The patchkit also supplies a patch for xntp3-5_91 which patches
ntp_refclock.c. The patch's name is patch-xntp3-5.91. When I apply
this patch, I get the following:
[root@k4ziv xntpd]# patch -p < ../patch-xntp3-5.91
Hmm...  Looks like a unified diff to me...
The text leading up to this was:
--------------------------
|--- ntp_refclock.c~    Wed Oct  1 15:19:25 1997
|+++ ntp_refclock.c     Thu Oct 16 20:56:08 1997
--------------------------
Patching file ntp_refclock.c using Plan A...
Hunk #1 succeeded at 1185 (offset -5 lines).
Hmm...  The next patch looks like a unified diff to me...
The text leading up to this was:
--------------------------
|--- ntp_refclock.c~    Mon Oct 20 22:25:45 1997
|+++ ntp_refclock.c     Wed Oct 22 22:55:06 1997
--------------------------
Patching file ntp_refclock.c using Plan A...
Hunk #1 succeeded at 31.
Hunk #2 failed at 1191.
1 out of 2 hunks failed--saving rejects to ntp_refclock.c.rej
done

The Patch program is smarter than me about this and I am not able
to manually integrate the .rej file.
I guess there is a mixup in the level's and names targeted by this
patch.
What are the exact PPSkit and xntp levels that someone (Randolph?)
has had success with?

73 de Russ Garber
rgarber@k4ziv.erols.com
```

23. [TACGPS:899] Re: XNTPD?

From: Randolph Bentson <bentson@grieg.holmsjoen.com>
Date: Fri, 12 Dec 1997 23:08:22 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199712130503.VAA20965@grieg.holmsjoen.com>
Rendered body type: text/plain

```
RHS Linux User <tapr@k4ziv.erols.com> wrote:

    I downloaded the above mentioned patchkit. The latest was
    ppskit-0.3.4.tar.gz.  ... When I apply this patch, I get
    the following:
    ...
    --------------------------
    |--- ntp_refclock.c~    Mon Oct 20 22:25:45 1997
    |+++ ntp_refclock.c     Wed Oct 22 22:55:06 1997
    --------------------------
    Patching file ntp_refclock.c using Plan A...
    Hunk #1 succeeded at 31.
```

```
    Hunk #2 failed at 1191.
    1 out of 2 hunks failed--saving rejects to ntp_refclock.c.rej
    done

    What are the exact PPSkit and xntp levels that someone
    (Randolph?) has had success with?

I've seen some patches fail because the source has spaces
instead of a tab.  A quick glance at what I've got suggests
this problem happened with this code/patch combination.  I
just forgot that I had to deal with it.  The "-l" or
"--ignore-whitespace" option will tell patch to treat the
two cases as equivalent.

I think this change will get you clear of this problem.
(Remember, it will be best if you start with another copy
of xntpd sources.  If you're really careful, you might
be able to apply the patch in ntp_refclock.c.rej to
ntp_refclock.c with this new option in place.)

Randolph Bentson
```

24. [TACGPS:900] TAC 32 Thoughts for GPS30PC

```
From: "David Bloodgood" <dabldgd@pacbell.net>
Date: Sat, 13 Dec 1997 07:34:39 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199712131330.FAA29365@mail-gw.pacbell.net>
Rendered body type: text/plain
```

For those of us who haven't screwed up the courage to open these modules to get the 1pps signal out and who would be entirely happy with a less than "Totally accurate clock", would it be possible to use the fact that the $GPRMC message is emitted immediately after the 1 pps pulse to provide coarse time synchronization - at least good enough to keep the PC clock from drifting. I envision time tagging the arrival of the '$' of the GPRMC message, with the PC clock, calculating a correction factor and applying it, in much the same way that the 1pps input is processed.

Is this feasible ?

Dave Bloodgood, kd6pro

25. [TACGPS:901] NMEA Checksum question

```
From: "David Bloodgood" <dabldgd@pacbell.net>
Date: Sat, 13 Dec 1997 07:34:55 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199712131331.FAA13296@mail-gw2.pacbell.net>
Rendered body type: text/plain
```

How is the checksum at the end of the NMEA sentance calculated ?

Does it include the $, the message name, the * ?

Any thoughts would be appreciated

Thanks, Dave, kd6pro

26. [TACGPS:902] RE: TAC 32 Thoughts for GPS30PC

```
From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sat, 13 Dec 1997 07:59:13 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <01BD07A5.59F26CE0@rick.cnssys.com>
Rendered body type: text/plain
```

Dave,

Yes, it is. I am planning on doing this soon. I have a GPS-III which I would like to connect the same way. I also am planning on a network client version of TAC32 with the same requirement (work even if there's no 1pps). It will be available soon.

Rick

```
-----Original Message-----
From:   David Bloodgood [SMTP:dabldgd@pacbell.net]
Sent:   Saturday, December 13, 1997 8:29 AM
To:     tacgps@tapr.org
Cc:     rick@cnssys.com
Subject:        TAC 32 Thoughts for GPS30PC
```

For those of us who haven't screwed up the courage to open these modules to
get the 1pps signal out and who would be entirely happy with a less than
"Totally accurate clock", would it be possible to use the fact that the
$GPRMC message is emitted immediately after the 1 pps pulse to provide
coarse time synchronization - at least good enough to keep the PC clock
>from drifting. I envision time tagging the arrival of the '$' of the GPRMC
message, with the PC clock, calculating a correction factor and applying
it, in much the same way that the 1pps input is processed.

Is this feasible ?

Dave Bloodgood, kd6pro

27. [TACGPS:903] RE: NMEA Checksum question

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sat, 13 Dec 1997 08:05:19 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <01BD07A6.6235CAE0@rick.cnssys.com>
Rendered body type: multipart/mixed

[No readable text body. See the preserved original monthly archive.]
[Inline non-text content: multipart/mixed; 617 bytes]

28. [TACGPS:904] Re: TAC 32 Thoughts for GPS30PC

From: Dave Martindale <davem@cs.ubc.ca>
Date: Sat, 13 Dec 1997 10:42:26 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <l03102000b0b8632c88df@[198.162.38.159]>
Rendered body type: text/plain

>For those of us who haven't screwed up the courage to open these modules to
>get the 1pps signal out and who would be entirely happy with a less than
>"Totally accurate clock", would it be possible to use the fact that the
>$GPRMC message is emitted immediately after the 1 pps pulse to provide
>coarse time synchronization - at least good enough to keep the PC clock
>from drifting. I envision time tagging the arrival of the '$' of the GPRMC
>message, with the PC clock, calculating a correction factor and applying
>it, in much the same way that the 1pps input is processed.

I expect that should work well with the GPS 20/30. As far as I can tell by
eye, looking at the NMEA data on a terminal emulator while the 1 PPS LED
flashes are visible from the corner of my eye, this initial '$' is
coincident with the rising edge of 1 PPS. An oscilloscope would give you
a better idea of the actual timing jitter in the beginning of that first
character, but it's certainly a small fraction of a second at worst.
It's certainly good enough for synchronizing a clock that only counts
whole seconds anyway.

On the other hand, that only applies to the 20/30, and probably to the
25/35 receivers. Someone else mentioned doing this with a GPS III.
I don't have a III, but I have looked at the NMEA output of the GPS 38, 45,
and I think 12XL. On these handheld consumer receivers, the output is
not synchronized to the beginning of each GPS second. The NMEA data
does repeat about every 2 seconds (not 1 second - there is more data),
but it appears to be initiated by some software process inside the GPS
receiver controlled by its own clock oscillator, not corrected to GPS time.

Since each NMEA burst starts at a time not correlated to GPS time, the
initial character of the GPRMC message appears on average a half second
after the time reported in this message. Worse, the delay is not
consistent, since the NMEA "issue clock" is not synchronized to GPS time.
I collected the data output of a GPS 45XL for 2 hours once. If the
beginning of each NMEA data burst was synchronized to GPS time, you would
expect that each GPRMC message would indicate a time that is 2 seconds
later than the previous GPRMC message, without exception. In fact, most
time increments were 2 seconds, but about 20 times in that period the
increment was 3 seconds insteads. This indicates that the NMEA issue
rate was just slightly slower than once every 2 seconds, and the difference
between the time of start of each NMEA burst and the start of the previous
GPS second slowly increased until it amounted to a whole second. At that
point, there was a whole-second "jump" in the time reported by NMEA, and
the error was reduced by a second. These "jumps" happened about every
8 minutes at first, indicating that the NMEA "issue clock" was about 0.21%
slow compared to real time.

In addition, the drift rate of the "NMEA clock" was not consistent. Later
in the 2-hour period, the 3-second jumps were happening about once every
6 minutes instead of once every 8 minutes. This is probably because the

GPS innards had warmed up over the operating period.

Finally, there is also some jitter in the reported time. Seven times during the 2-hour period, there was not a clean 3-second jump to resynchronize the NMEA clock to GPS time. Instead, one GPRMC message would indicate a time 3 seconds after the previous one, but the following GPRMC message would be only 1 second later, giving no net correction. Then, soon after, there would be another 3-second change which "stuck", without being offset by a following 1-second change. This indicates that as the NMEA clock and the GPS clock slowly drift relative to each other, there is some jitter on one of them (likely the GPS time). This can cause the NMEA time reported to "jump" back and forth by a second when you aren't expecting it.

My conclusion was that at the times you see the GPRMC time change by 3 seconds instead of 2, you know that the NMEA and GPS times are rather accurately synchronized (plus or minus a fixed offset). But most of the time, the NMEA data burst tells you the time with up to one second of error, and this error slowly drifts with time. It would take some relatively sophisticated filtering to accurately set another clock from observations of the NMEA data stream on one of the handheld receivers. They just aren't designed to provide accurate timing.

Dave

29. [TACGPS:905] Re: TAC 32 Thoughts for GPS30PC

From: Randolph Bentson <bentson@grieg.holmsjoen.com>
Date: Sat, 13 Dec 1997 11:13:09 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199712131710.JAA23628@grieg.holmsjoen.com>
Rendered body type: text/plain

David Bloodgood <dabldgd@pacbell.net> wrote:
> ... would it be possible to use the fact that the
> $GPRMC message is emitted immediately after the 1 pps pulse to provide
> coarse time synchronization ....

> Is this feasible ?

It'll get you to within a second, but the rest is a bit more difficult.

Such a scheme would require some careful work with filtering the time from the NMEA source. The GPS20SL (inside the GPS30PC) provides a source with a fast 100 ms jitter. Other units, such as the GPS38, are even less well behaved--I've seen 800 ms error.

My preliminary work shows that averaging 100+ points from the GPS20SL gives a signal which would work. I fear that the same wouldn't work for the GPS38.

Such an averaging effect might be achievable within the xntpd code. Perhaps one could tune some parameters to get the right result. I'll leave that to someone else.

Look at http://www.aa.net/~bentson/clock20.ps and clock22.ps for a plot of peerstats data on the PPS and GPS20SL clocks. (I'll try to post clock20B.ps (for the GPS38) later today.)

Randolph Bentson

30. [TACGPS:906] How Much is Too Much

From: W4OQM@aol.com
Date: Sun, 14 Dec 1997 14:09:55 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <971214150830_1579967017@mrin52>
Rendered body type: text/plain

My GPS30 is currently mounted (with the mag mount) on the dash of my van. This works OK most of the time; but since it doesn't get a very good view of the sky, I was thinking of mounting it on the roof.

I operate FM from the van on three bands: 2m @ 50 watts, 70 cm @ 35 watts, and 23 cm @ 10 watts. I have a dual band antenna for 2m/70cm (0 dBd/2 dBd) and a colinear dual 5/8ths wave for 23 cm (5 dBd).

Now, the question for the group is, how close can I get to one of these antennas before I damage the front end of the GPS30? I understand that it's tough to get a quantitative answer to this question, so I'm looking more for qualitative comments based on experience. How close have folks mounted the

GPS30 to a transmitting antenna? Has anyone smoked a GPS30 yet?

Charlie -- W4OQM@aol.com

31. [TACGPS:907] How Much is Too Much

From: mikebw@bilow.bilow.uu.ids.net (Mike Bilow)
Date: Sun, 14 Dec 1997 23:21:30 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <49484311@bilow.bilow.uu.ids.net>
Rendered body type: text/plain

W4OQM wrote in a message to Mike Bilow:

 W> Now, the question for the group is, how close can I get to
 W> one of these antennas before I damage the front end of the
 W> GPS30? I understand that it's tough to get a quantitative
 W> answer to this question, so I'm looking more for qualitative
 W> comments based on experience. How close have folks mounted
 W> the GPS30 to a transmitting antenna? Has anyone smoked a
 W> GPS30 yet?

I've run my GPS38 a few feet away from a 144/440 MHz transmitting antenna, and it has never done any damage. If I key up with a full 50W FM on 440 MHz, I lose the ability to see any of the satellites, essentially what you would expect in a situation of severe overload. However, the GPS38 always comes right back as soon as I unkey. I'm not advancing this as scientific evidence by any means, but the GPS38 is so inexpensive that I would not be heartbroken if the transmitter someday destroyed it.

-- Mike

32. [TACGPS:908] Re: How Much is Too Much

From: "Jon V. Twork" <twork@pobox.com>
Date: Sun, 14 Dec 1997 23:53:10 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <01bd091c$87c4d540$1f17d8d0@twork>
Rendered body type: text/plain

Yikes.............I just mounted my Lowe external antenna on top of my motorhome and within 2 feet of a 2mtr antenna putting out 50 watts and just six feet away is a 11mtr putting out 100 watts and soon to come is a 6mtr antenna putting out 125 watts........

Am I living on barrowed time.........is the GPS II+ or the Lowe external antenna about to "Grenade"?

Please advise.......

-----Original Message-----
From: Mike Bilow <mikebw@bilow.bilow.uu.ids.net>
To: tacgps@tapr.org <tacgps@tapr.org>
Date: Monday, December 15, 1997 12:30 AM
Subject: [TACGPS:907] How Much is Too Much

>
>
>W4OQM wrote in a message to Mike Bilow:
>
> W> Now, the question for the group is, how close can I get to
> W> one of these antennas before I damage the front end of the
> W> GPS30? I understand that it's tough to get a quantitative
> W> answer to this question, so I'm looking more for qualitative
> W> comments based on experience. How close have folks mounted
> W> the GPS30 to a transmitting antenna? Has anyone smoked a
> W> GPS30 yet?
>
>I've run my GPS38 a few feet away from a 144/440 MHz transmitting antenna,
and
>it has never done any damage. If I key up with a full 50W FM on 440 MHz, I
>lose the ability to see any of the satellites, essentially what you would
>expect in a situation of severe overload. However, the GPS38 always comes
>right back as soon as I unkey. I'm not advancing this as scientific
evidence
>by any means, but the GPS38 is so inexpensive that I would not be
heartbroken

>if the transmitter someday destroyed it.
>
>-- Mike
>
>

33. [TACGPS:909] Update on TAPR GPS Items

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Mon, 15 Dec 1997 03:06:57 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <v0313032ab0ba9e37c041@[208.134.134.40]>
Rendered body type: text/plain

The TAPR GPS Page has been updated to include the Garmin GPS-25 OEM board.
http://www.tapr.org/gps/

The GPS-25 is $20 more expensive then the GPS-20, but it is a true 12
channel parallel sensor. Several of you have contacted the office about
when we would have these -- they are available now for ordering. As with
the GPS-20, we will be placing orders the first of each month. We will
continue to offer the GPS-20 as long as Garmin makes them available for
those that want the multitrack unit.

We will be adding the Garmin GA27 antenna to the items offered in the next
few weeks.

Also, keep an eye out for an inexpensive solution for DGPS. Something that
a lot of you have been asking for over the last year. When a kit or
possible semi-kit is available, it should be very popular! TAPR will post
something when official.

On a last note regarding the GPS30PC offer -- out of the some 400+ units
made available to members, we had 5 failed units returned. Special thanks
to Brad Wiseman and GARMIN for allowing TAPR to make these units available
to the amateur radio community. Dorothy reported that we had about 15
GPS30PCs left that have either been orders that were cancelled or not
purchased after sending e-mail.

Best wishes on this upcoming holidays.

Cheers -- Greg

Greg Jones, WD5IVD
Austin, Texas
wd5ivd@tapr.org
http://www.tapr.org/~wd5ivd

34. [TACGPS:910] RE: Smoking a GPS-30

From: Darryl Smith <vk2tds@ozemail.com.au>
Date: Mon, 15 Dec 1997 03:46:44 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <3494FAE0.B09C60AF@ozemail.com.au>
Rendered body type: text/plain

Well - I think that I have had a problem with electro-magnetic radiation taking
out my GPS-30 - but only for a few minutes. But the radiation was in the
infra-red band...

Basically a few weeks ago I had the GPS loose itself in good areas a few times. I
think the heat was the problem. Having a black GPS on a white car in the
Australian summer sun is not wise. Basically the temperature in the shade was
about 35-37 degrees celcius. With the warm air, in direct sun with reflected
sunlight, it got HOT.

Darryl
Vk2TDS@Ozemail.com.au

35. [TACGPS:911] TAC32 Version 1.1.1 is available

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Mon, 15 Dec 1997 09:20:08 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <01BD0942.66FBA020@rick.cnssys.com>
Rendered body type: multipart/mixed

[No readable text body. See the preserved original monthly archive.]
[Inline non-text content: multipart/mixed; 915 bytes]

36. [TACGPS:913] RE: Smoking a GPS-30

From: mikebw@bilow.bilow.uu.ids.net (Mike Bilow)
Date: Mon, 15 Dec 1997 13:17:38 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <49548d00@bilow.bilow.uu.ids.net>
Rendered body type: text/plain

Darryl Smith wrote in a message to Mike Bilow:

```
 DS> Basically a few weeks ago I had the GPS loose itself in good
 DS> areas a few times. I think the heat was the problem. Having a
 DS> black GPS on a white car in the Australian summer sun is not
 DS> wise. Basically the temperature in the shade was about 35-37
 DS> degrees celcius. With the warm air, in direct sun with
 DS> reflected sunlight, it got HOT.
```

The Garmin engines measure the ambient temperature and correct for it. You can actually get the temperature to display on the handheld units (such as the GPS38 or the GPS12) by entering the undocumented debug mode, in which the temperature in degrees appears to the upper right of the time on the location page. The degrees are either Fahrenheit or Celsius depending upon the usual global English/metric setting.

To enter debug mode, press all four arrow directions sequentially, immediately after power-on while the globe is still turning. Other aspects of debug mode are described in the Garmin FAQ floating around on the Internet. For example, the added numbers which appear on the satellite page are the horizontal dilution of position, a measure of the quality of the position information.

I do not know how to get the temperature information out of the bare engine such as the GPS30, but there is probably a proprietary NMEA sentence related to it. Someone else on this list may know the exact procedure.

-- Mike

37. [TACGPS:914] RE: Smoking a GPS-30

From: Jan Marius Evang <jane@iaeste.no>
Date: Mon, 15 Dec 1997 13:56:55 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <m2g1nuidw5.fsf@la1ad.uio.no>
Rendered body type: text/plain

>> Mike Bilow writes:

```
  MB> I do not know how to get the temperature information out of the
  MB> bare engine such as the GPS30, but there is probably a
  MB> proprietary NMEA sentence related to it. Someone else on this
  MB> list may know the exact procedure.
```

it's in the $PGRMT sentence, field 8 degrees celsius.

Marius

--
-O
R□yskatt

38. [TACGPS:915] Page 83 of QST

From: "Steven R. Bible" <srbible@gate.net>
Date: Mon, 15 Dec 1997 18:44:57 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19971215194258.008a6b70@pop.gate.net>
Rendered body type: text/plain

There's a picture of Tom on Page 83 of the January QST. There's a infomation box in the top right hand corner showing Tom showing off his TAC's and mention of the Digital Communications Conference held in October in Baltimore, MD.

- Steve, N7HPR
(n7hpr@tapr.org)

39. [TACGPS:916] Re: XNTPD?

From: RHS Linux User <tapr@k4ziv.erols.com>
Date: Wed, 17 Dec 1997 18:03:42 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <Pine.LNX.3.95.971217181014.29499A-100000@k4ziv.erols.com>

Rendered body type: text/plain

Thanks Randolph, the --ignore-whitespace worked with the patch.
I now have the atom driver running with the pps input, nearly
as it should. I say nearly because the only way I have found to
verify it is to watch the 'kerninfo' pps status figures from
xntpdc. The stability and jitter numbers go to 200 (max) with
the pps signal unplugged and work back down to .003 or so and
50us with it plugged back in. The ntpq peer command left margin
code <sp> means: discarded due to high stratum and/or failed sanity
checks. I suppose this is because of the beta nature of the patches
and perhaps the various staus haven't caught up with the functions?
It also gives <sp> on the local clock driver (any ideas?).
   One problem I had to overcome was the msfees driver caused compile
errors after the patch, my solution was to delete all refs to it.
   Best I can make out, to run both NEMA and ATOM, I need two cables
and two ports, is this correct?
Thanks again,
Russ Garber
rgarber@k4ziv.erols.com

On Fri, 12 Dec 1997, Randolph Bentson wrote:

> I've seen some patches fail because the source has spaces
> instead of a tab. A quick glance at what I've got suggests
> this problem happened with this code/patch combination. I
> just forgot that I had to deal with it. The "-l" or
> "--ignore-whitespace" option will tell patch to treat the
> two cases as equivalent.
>
> I think this change will get you clear of this problem.
> (Remember, it will be best if you start with another copy
> of xntpd sources. If you're really careful, you might
> be able to apply the patch in ntp_refclock.c.rej to
> ntp_refclock.c with this new option in place.)
>
> Randolph Bentson
>

40. [TACGPS:917] Re: XNTPD?

From: "Henk Uijterwaal (RIPE-NCC)" <henk@ripe.net>
Date: Thu, 18 Dec 1997 02:43:34 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <Pine.SUN.3.95.971218093924.25797A-100000@ncc.ripe.net>
Rendered body type: text/plain

On Wed, 17 Dec 1997, RHS Linux User wrote:

>   Best I can make out, to run both NEMA and ATOM, I need two cables
> and two ports, is this correct?

No, one cable is enough, put the PPS on the carrier-detect pin and the
NMEA data on Send/Receive data. Works fine for the machines that we have
here.

Henk

Henk Uijterwaal   Email: henk.uijterwaal@ripe.net
RIPE Network Coordination Centre   WWW: http://www.ripe.net/home/henk
Singel 258   Phone: +31.20.535-4414, Fax -4445
1016 AB Amsterdam   Home: +31.20.6651962
The Netherlands   Pager: +6.57626855

%DCL-E-NOCFFE, unable to locate coffee - keyboard input suspended.

41. [TACGPS:918] Re: XNTPD?

From: RHS Linux User <tapr@k4ziv.erols.com>
Date: Thu, 18 Dec 1997 19:59:49 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <Pine.LNX.3.95.971218204304.23192A-100000@k4ziv.erols.com>
Rendered body type: text/plain

Thanks to Randolph and Henk for help. I am stuck on the NMEA driver part.
When I try Randolphs ntp.conf (at least the lines for 127.127.22.0 and
127.127.20.0), the .20.0 NMEA driver fails thus:
18 Dec 20:30:50 xntpd[22956]: logging to file /var/log/xntpd.log

```
18 Dec 20:30:50 xntpd[22956]: xntpd 3-5.91 Sat Dec 13 11:01:10 EST 1997 (1)
18 Dec 20:30:50 xntpd[22956]: tickadj = 5, tick = 10000, tvu_maxslew = 495, est. hz = 100
18 Dec 20:30:50 xntpd[22956]: precision = 9 usec
18 Dec 20:30:50 xntpd[22956]: read drift of 19.513 from /etc/ntp.drift
18 Dec 20:30:50 xntpd[22956]: refclock_newpeer: clock type 20 invalid
18 Dec 20:30:50 xntpd[22956]: configuration of 127.127.20.0 failed
18 Dec 20:31:21 xntpd[22956]: xntpd exiting on signal 15

Here are my links in dev (my config for atom called for the ptb0 to make
it work):
lrwxrwxrwx   1 root     root            5 Dec 10 22:46 gps0 -> ttyS1
lrwxrwxrwx   1 root     root            5 Dec 10 22:34 pps0 -> ttyS1
lrwxrwxrwx   1 root     root            5 Dec 13 11:24 ptb0 -> ttyS1
crw-r--r--   1 root     root       4,  65 Dec 18 20:33 ttyS1

This is with xntp3-5.91 and 2.0.32 kernel.
My problem with NMEA could be with the item about adding -DNMEA
in config.local if so, please send the full line entry as a sample
for me, please. I tried several ways there and none seemed to make
any difference in my build. My config.h has #define NMEA 1 in it.

The pps driver seems to be working though it doesn't match the way
anyone else is doing it here (nor the doc with the /dev/ptb0)!

Any ideas about why my atom driver seems to work this way (dtscp -c
kerninfo shows favorable PPS statistics but -peers doesn't) would
be interesting. Any more tips about how to get the NMEA and ATOM
working together would be much appreciated!

Thanks again,
Russ
rgarber@k4ziv.erols.com
```

42. [TACGPS:919] Re: XNTPD?

```
From: "Henk Uijterwaal (RIPE-NCC)" <henk@ripe.net>
Date: Fri, 19 Dec 1997 02:51:14 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <Pine.SUN.3.95.971219093500.4854A-100000@ncc.ripe.net>
Rendered body type: text/plain
```

```
On Thu, 18 Dec 1997, RHS Linux User wrote:

> Thanks to Randolph and Henk for help. I am stuck on the NMEA driver part.
> When I try Randolphs ntp.conf (at least the lines for 127.127.22.0 and
> 127.127.20.0), the .20.0 NMEA driver fails thus:
> 18 Dec 20:30:50 xntpd[22956]: logging to file /var/log/xntpd.log
> 18 Dec 20:30:50 xntpd[22956]: xntpd 3-5.91 Sat Dec 13 11:01:10 EST 1997 (1)
> 18 Dec 20:30:50 xntpd[22956]: tickadj = 5, tick = 10000, tvu_maxslew = 495, est. hz = 100
> 18 Dec 20:30:50 xntpd[22956]: precision = 9 usec
> 18 Dec 20:30:50 xntpd[22956]: read drift of 19.513 from /etc/ntp.drift
> 18 Dec 20:30:50 xntpd[22956]: refclock_newpeer: clock type 20 invalid
> 18 Dec 20:30:50 xntpd[22956]: configuration of 127.127.20.0 failed
> 18 Dec 20:31:21 xntpd[22956]: xntpd exiting on signal 15
>
> Here are my links in dev (my config for atom called for the ptb0 to make
> it work):
> lrwxrwxrwx   1 root     root            5 Dec 10 22:46 gps0 -> ttyS1
> lrwxrwxrwx   1 root     root            5 Dec 10 22:34 pps0 -> ttyS1
> lrwxrwxrwx   1 root     root            5 Dec 13 11:24 ptb0 -> ttyS1
> crw-r--r--   1 root     root       4,  65 Dec 18 20:33 ttyS1
>
> This is with xntp3-5.91 and 2.0.32 kernel.
> My problem with NMEA could be with the item about adding -DNMEA
> in config.local if so, please send the full line entry as a sample
> for me, please. I tried several ways there and none seemed to make
> any difference in my build. My config.h has #define NMEA 1 in it.
>
> The pps driver seems to be working though it doesn't match the way
> anyone else is doing it here (nor the doc with the /dev/ptb0)!
>
> Any ideas about why my atom driver seems to work this way (dtscp -c
> kerninfo shows favorable PPS statistics but -peers doesn't) would
> be interesting. Any more tips about how to get the NMEA and ATOM
> working together would be much appreciated!

The log file seems to suggest that your ntp doesn't recognize the TAC or
that it doesn't support GPS_NMEA, so the first thing that I would check is
if the TAC is in NMEA mode.  I wasted quite some time on that this summer
when I tried to access my clock using 9600 baud and Motorola's binary
```

format, immediately after I used it with showtime on a DOS box (which sets
the TAC to 4800 baud, NMEA mode). If your TAC is in the wrong format,
then xntpd will fail to init the clock.

I have a few little programs to control the TAC under Unix, which I'll
attach to this mail. Basically, tac_format sets the output format to NMEA
or MPB, tac_mpb and tac_nmea listen to the TAC and print out all Motorola
Proprietairy Binary format or NMEA strings that they see. If you're
trying to run in NMEA format, run tac_nmea and check that it prints out
strings like:

 $GPRMC,150612.00,A,5222.3664,N,00453.2537,E,0.9,184.3,181297,1.8,W*40

every second. If not, then you're TAC is probably in MPB mode and you
have to switch it before starting NTP. (Note that the programs are for
FreeBSD, you may have to hack things a bit for Linux, if you have to
change things, please send me a copy.)

If this doesn't help, I'd stick in a few lines of debugging code and check
if the refclock_nmea.c code is really called.

Finally, I'd also post these questions on the comp.protocols.time.ntp
newsgroup. There are a lot of knowledgable people there, we got a lot of
help from there when we first tried to set up ntp.

Henk

Henk Uijterwaal   Email: henk.uijterwaal@ripe.net
RIPE Network Coordination Centre   WWW: http://www.ripe.net/home/henk
Singel 258   Phone: +31.20.535-4414, Fax -4445
1016 AB Amsterdam   Home: +31.20.6651962
The Netherlands   Pager: +6.57626855

%DCL-E-NOCFFE, unable to locate coffee - keyboard input suspended.

43. [TACGPS:920] Re: XNTPD?

From: "Henk Uijterwaal (RIPE-NCC)" <henk@ripe.net>
Date: Fri, 19 Dec 1997 03:50:22 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <Pine.SUN.3.95.971219104343.4854C-101000@ncc.ripe.net>
Rendered body type: text/plain

I wrote:

> I have a few little programs to control the TAC under Unix, which I'll
> attach to this mail.

.. and then forgot to add the attachment. Here it is.

Henk

Henk Uijterwaal   Email: henk.uijterwaal@ripe.net
RIPE Network Coordination Centre   WWW: http://www.ripe.net/home/henk
Singel 258   Phone: +31.20.535-4414, Fax -4445
1016 AB Amsterdam   Home: +31.20.6651962
The Netherlands   Pager: +6.57626855

%DCL-E-NOCFFE, unable to locate coffee - keyboard input suspended.
[Attachment: tac.tgz; application/octet-stream; 7,943 bytes]

44. [TACGPS:921] XNTPD: ZDA vs GGA vs RMC NMEA Messages

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Fri, 19 Dec 1997 12:12:51 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <349AB895.B56EC4D1@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Concerning the progress on xntpd'ing the TAC (especially for LINUX),
Ed Himwich in my group here at NASA/GSFC will also be working on the
topic soon. We use LINUX as the station/instrument controller in the
VLBI stations that were the original tagert for the TACs.

Let me point out one potential problem that I believe exists in the
existing NMEA code. As I understand it, the UTC time is picked up from

the $GPGGA (or possibly the $GPRMC) NMEA message. The time in these
messages is defined as the time of THE LAST VALID POSITION FIX.

High accuracy users of the TACs put the receiver into "zero-D" mode
with the position forced to be the previously determined reference
position with position fixing disabled. The zero-D mode makes a VAST
improvement in timing accuracy, as can be seen in the example on my
ftp server at URL

  ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/oso-d270.gif

When forced into the zero-D mode, the ONCORE (quite properly) reports
the time in the GGA & RMC messages as the time when the user last
invoked zero-D operation, which may be days, weeks, or months ago!

The >PROPER< NMEA message to use (which I believe is not supported)
is $GPZDA which is the CURRENT UTC time, regardless of operating mode.
The ZDA message is also nice in that it also includes the YYMMDD date
(which is missing in the GGA message and is in a bizzare backwards
format in RMC).

For users of other receivers -- the ZDA message is not universally
supported, especially on receivers that do not have a "zero-D" mode
(like the Garmins). So the xntpd code needs to allow for this option.
I'd suggest that the code either have a "which NMEA message should I
use?" switch, or it should look for ZDA messages and use them if
possible, reverting to GGA/RMC messages only if the ZDA message is
missing.

Feliz Navidad -- Tom

45. [TACGPS:922] A small correction

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Fri, 19 Dec 1997 12:20:08 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <349AB9C1.1D3030D7@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

My posting a few minutes ago pointed you to the URL

  ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/oso-d270.gif

In looking at that .GIF file, I noticed that I forgot to correct a
minor typo on the graph. The Y-axis shows a 7600-8600 microsec scale.
The correct units are NANOseconds (i.e. 7.6-8.6 microsec). I made
this plot a couple of years ago and I forgot to fix it up -- sorry.

Tom

46. [TACGPS:923] Precise Timing of NMEA messages

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Fri, 19 Dec 1997 12:46:32 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <349ABFAD.7C4DDF22@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

The thread popped up here again last week about using the NMEA messages
by themselves for timing. In my experience this does not work very well
and I would advise against it if you want timing you can trust at sub-
second levels. This is precisely the reason that I defined the TAC as
having a HARDWARE 1PPS signal on an RS232 handshaking line.

(1) The posting of time/position to the display and/or the NMEA output
    handler is the LOWEST priority task for the GPS rcvr's embedded
    microprocessor for every rcvr I have seen. This is not a synch-
    ronous process and hence the timing is not guaranteed.

(2) The length of the NMEA messages is variable. The number of some
    types of messages sent (especially $GPGSV) is variable. Even if
    the rcvr's NMEA handler started sending at a (nearly) predictable
    time, the number of characters sent before the time is output may
    be variable. The is especially true of the ONCORE. For reasons I
    noted in my previous posting, the PROPER message to use for timing
    (if it is available) is $GPZDA. But in the ONCORE, the NMEA msgs
    are sent in alphabetical order, with ZDA >>LAST<<. Hence, with
    an unknown number of variable length messages preceeding the timing
    information, the timing that message is unreliable. [FYI: in
    SHOWTIME, I included a within-the-second "stopwatch" (available
    with the "&" key) that shows the time-of-arrival (in 10 msec steps)

of any of the NMEA messages to explore these issues.]

(3) Not all receivers output their messages every second. For instance, the Garmin handhelds have a 2 second rate since they send too much data to fit into a 1-second block. On other rcvrs (like the ONCORE) the message rate can be set to be slower than one second.

For these reasons, I recommend the approach taken in SHOWTIME and TAC32. The time is read on the RS232 input slightly late, but within the second (equivalent to WWV announcing "At the tone, the time WAS xxxx"). The software increments the time to the next second, and posts it to the computer when the next hardware RS232 1PPS signal arrives. The time incrementing to the next second is modulo 60 sec, then modulo 60 minutes, then modulo 24 hours. [This has a slight failure at times of leap seconds since it produces two succesive :00 seconds, rather than the correct :58 :59 :60 :00 second sequence since I didn't do anything with the leap-seconds pending data.]

Tom

47. [TACGPS:924] Re: XNTPD: ZDA vs GGA vs RMC NMEA Messages

From: Jeremy Bishop <jeremyb@canb.auug.org.au>
Date: Sat, 20 Dec 1997 06:34:46 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199712201233.XAA14121@pcug.org.au>
Rendered body type: text/plain

[As background: I have assembled my TAC-2/Oncore - all working nicely, and I've just started to play with xntpd ...]

Tom Clark (W3IWI) <clark@tomcat.gsfc.nasa.gov> writes:

<...>
> Let me point out one potential problem that I believe exists in the
> existing NMEA code. As I understand it, the UTC time is picked up from
> the $GPGGA (or possibly the $GPRMC) NMEA message. The time in these
> messages is defined as the time of THE LAST VALID POSITION FIX.

Correct - the current "generic" NMEA driver uses the $GPRMC message.

<...>
> When forced into the zero-D mode, the ONCORE (quite properly) reports
> the time in the GGA & RMC messages as the time when the user last
> invoked zero-D operation, which may be days, weeks, or months ago!

Hmm. In zero-D mode my Oncore receiver (firmware rev 8.8) reports the time _only_ in the ZDA sentence. The time fields in the GGA, RMC, and GSA sentence are empty (with the RMC sentence marking the time status as invalid). Hence the existing xntpd/NMEA code doesn't work in zero-D mode at all :-(

> The >PROPER< NMEA message to use (which I believe is not supported)
> is $GPZDA which is the CURRENT UTC time, regardless of operating mode.
> The ZDA message is also nice in that it also includes the YYMMDD date
> (which is missing in the GGA message and is in a bizzare backwards
> format in RMC).

You are correct in saying that the ZDA message is currently not supported in the xntpd (version 3.5-91). I have done a quick hack to the driver (refclock_nmea.c) to parse ZDA sentences instead of RMC, which (once I had sorted out a couple of minor problems) is working nicely. In the long run I think it would be better to create a new driver specifically for the Oncore with support for 3-D and zero-D modes. To get the most out of the receiver, we'd need to use the Motorola Binary Protocol (or switch to/from MBP/NMEA as required, a la SHOWTIME).

> For users of other receivers -- the ZDA message is not universally
> supported, especially on receivers that do not have a "zero-D" mode
> (like the Garmins). So the xntpd code needs to allow for this option.
> I'd suggest that the code either have a "which NMEA message should I
> use?" switch, or it should look for ZDA messages and use them if
> possible, reverting to GGA/RMC messages only if the ZDA message is
> missing.

Yep - another possibility.

Regards,
Jeremy

--
Jeremy Bishop
jeremyb@canb.auug.org.au
Australian Unix User Group (AUUG) Canberra Chapter

48. [TACGPS:925] Noise needed

From: Brooks Shera <ebs@lanl.gov>
Date: Sat, 20 Dec 1997 16:31:39 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199712202229.PAA07975@newreg.lanl.gov>
Rendered body type: text/plain

Hi Tom (W3IWI)

I noticed that in the file describing your "oso" data you
wrote:

>If anyone is interested, we can post the raw Onsala clock logs for
>you to peruse the data.

It would be helpful to me if you could do that, since I would
like to compute an accurate spectral density of gps phase noise.

My desire is to find a convenient way to let a user estimate an
appropriate filter time constant for his gps-disciplined OCXO
controller. The approach I have in mind is to implement a pair
of bandpass filters in the PIC that will measure and report the
rms phase noise in two frequency bands: one band covers a freq.
region where the gps phase noise dominates (e.g. a few 100 sec),
and the second band covering a region where the OCXO noise dominates
(e.g. 10000 sec). The two noise measurements can be made
simultaneously with the feedback loop open, so each noise source
contributes somewhat to both rms measurements. However, the
different spectral behaviour of gps and xtal noise, as shown
on your inspirational AV graph, should permit the contributions to be
separated.

>From the measurements and some model assumptions, a filter
time constant can presumably be estimated and also the performance of
the disciplined OCXO system with a particular OCXO can be estimated.
As you are well aware, the AV can be computed from the phase noise
spectrum (but not the other way around).

Of course the PIC could do all this on its own: open the loop,
measure for a few hours, adjust the time constant, and close
the loop. It could probably do it all with the loop closed with
lower accuracy. Something for the future.

If you have a different phase data file that is easier to post that's
great as long as it compares gps to a reasonably stable reference
and the sampling period is not too long so I can get the higher freq.
components (i.e. 100 seconds or so).
Thanks.

Any comments anyone has on the above scheme would be welcome.

Brooks

49. [TACGPS:926] Re: XNTPD: ZDA vs GGA vs RMC NMEA Messages

From: RHS Linux User <tapr@k4ziv.erols.com>
Date: Sun, 21 Dec 1997 21:27:23 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <Pine.LNX.3.95.971221221835.666A-100000@k4ziv.erols.com>
Rendered body type: text/plain

Hello Jeremy and all,
Your driver hack sounds like it might get me over a hump! I am running
in zero-D mode and failed to get the NMEA driver working, is or would
you make your refclock_nmea.c or patch file available?
Thanks es 73
de Russ
rgarber@k4ziv.erols.com

On Sat, 20 Dec 1997, Jeremy Bishop wrote:
> Hmm. In zero-D mode my Oncore receiver (firmware rev 8.8) reports the
> time _only_ in the ZDA sentence. The time fields in the GGA, RMC, and
> GSA sentence are empty (with the RMC sentence marking the time status
> as invalid). Hence the existing xntpd/NMEA code doesn't work in zero-D

> mode at all :-(

This matches my firmware and mode.

> You are correct in saying that the ZDA message is currently not supported
> in the xntpd (version 3.5-91). I have done a quick hack to the driver
> (refclock_nmea.c) to parse ZDA sentences instead of RMC, which (once I
> had sorted out a couple of minor problems) is working nicely.

50. [TACGPS:927] TAC32 Version 1.1.2 is available

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Tue, 23 Dec 1997 17:10:39 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <01BD0FCD.9BA2EC20@rick.cnssys.com>
Rendered body type: multipart/mixed

[No readable text body. See the preserved original monthly archive.]
[Inline non-text content: multipart/mixed; 2,485 bytes]

51. [TACGPS:928] Re: TAC32 Version 1.1.2 is available

From: Kohjin Yamada <kohjin@cosmos.marina.prug.or.jp>
Date: Wed, 24 Dec 1997 00:25:46 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199712240616.PAA01065@cosmos.marina.prug.or.jp>
Rendered body type: text/plain

Hello Rick,

Thank you very much for your continuous and great work on tac32!
I have still problems on both windows of "PC Time" and v1.1.2 "Display".
        PC Time; incorrect TIMEZONE PST instead of JA version of win95 JST
        Display; not selectable, only a horizontal bar and displays unknown
timezone's time
These troubles must come from the different win95 as you mentioned earlier.
Why don't you make it available to set timezone feature (i.e; SHOWTIME)
so that every different timezone user can be set by his own UTC offset +
TIMEZONE code?.
Are there any tac32 users using non US win95 in this reflector?

73 and Merry Christmas! Kohjin JR1EDE

52. [TACGPS:929] Nominations Sought for TAPR Board of Directors

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Thu, 25 Dec 1997 19:09:44 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <v03130309b0c8a625a448@[206.138.226.73]>
Rendered body type: text/plain

Nominations Sought for TAPR Board of Directors
(as printed in 1997 PSR #68, p. 34)

Tucson Amateur Packet Radio is incorporated in the State of Arizona as a
non-profit scientific and educational institution. It is recognized by the
IRS as a 501(c)3 tax-exempt organization for these same purposes. TAPR is
governed by a 9-member Board of Directors. Each member of the Board serves
a three year term. Every year three positions are up for election.

Board members are expected to attend two board meetings held in conjunction
with the Dayton Hamvention and the ARRL and TAPR Digital Communications
Conference. They participate in the decision-making process and provide
guidance to the officers. They receive no pay and must defray most of
their own expenses to attend meetings. Board members should be prepared to
be active in the continuing Board deliberations, which are conducted via
the Internet. Active participation in TAPR activities by Board members is
important to the furtherance of the objectives of TAPR. The officers of
TAPR are elected by the members of the Board at the annual Board of
Directors meeting.

The current members of the Board of Directors and their expiration dates of
their terms are:

*	John Ackermann, AG9V	1998	Vice President
*	Jim Neely, WA5LHS	1998	Treasurer
*	Barry McLarnon, VE3JF	1998	
	Steve Bible, N7HPR	1999	
	Gary Hauge, N4CHV	1999	
	Bob Hansen, N2GDE	1999	PSR Editor
	Greg Jones, WD5IVD	2000	President
	John Koster, W9DDD	2000	

Mel Whitten, K0PFX 2000

Nominations are now open for seats expiring in March 1998 (marked with an asterisk).

To place a person in nomination, please remember that he or she must be a member of TAPR. Confirm that the individual is willing to have their name placed in nomination. Send that person's name (or your own if you wish to nominate yourself) along with your call and their call, telephone numbers, mailing address, and Internet address. The person nominated should submit a short biographical sketch to be published along with the ballot.

Nominations and biographical sketches should be submitted to the TAPR office no later than December 31st, 1997.

Ballots will be mailed with the next PSR. TAPR will again use an Internet ballot, so read your ballot carefully. Results will be announced on March 30th, 1998.

Responsibilities of a board member include:
1) Attendance at both board meetings each year.
2) Regular participation with the continuous session of the board (currently held over the Internet). Typically this requires a minimum of 3 hours a week, although sometimes much more is required during active board discussions.
3) Participation with TAPR projects as volunteered. Board members, while not required, are involved with various project management, ongoing organization and/or supervision/liaison positions. Active board participation with various projects make many of the most important projects and tasks possible. Board members are expected to take an active part in TAPR in some form.

All nominated members will be placed on the ballot and the highest vote receivers will be placed in the open board positions. If elected, two board meetings in 1998 will be held. One will be during Dayton Hamvention and the other during the ARRL and TAPR Digital Communications Conference. All directors shall serve for a term of three years.

Tucson Amateur Packet Radio
8987-309 E Tanque Verde Rd #337 * Tucson, Az * 85749-9399
---
e-mail: tapr@tapr.org web: <http://www.tapr.org/>
ftp: ftp.tapr.org
phone: 940-383-0000 fax: 940-565-2544
---

53. [TACGPS:930] XNTPD & TAC & Linux

From: John Ackermann N8UR <jra@febo.com>
Date: Sat, 27 Dec 1997 14:40:59 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199712272035.PAA32411@meow.febo.com>
Rendered body type: text/plain

I have my Linux system and TAC configured so things *should* work, but I'm still
dazed and confused.

I'm using the generic nmea driver, and when I start the system it appears to be grabbing
RMC sentences, but after four or five polls I start seeing "no response" when I query the
clockstat info in xntpdc.

At first I thought maybe there was too much activity on the serial port, so I turned off
all the other Motorola output sentences, but still I have this problem.

I've yet to see xntpd sync to the nmea driver, or establish sync with the PPS signal. Any
suggestions?

Setup: Linux 2.0.33, xntpd3-5.91, both with PPSkit-0.3.4 patches installed. No, I'm not
running the Oncore in 0D mode -- the RMC sentences are banging out very nicely. I've
softlinked /dev/gps0 and /dev/pps0 to /dev/ttyS2, which is where the

TAC is connected.

Attached, for what it may be worth, is my ntp.conf file.

Thanks for any assistance.

73,
John N8UR (ex-AG9V)
jra@febo.com

```
# NTP configuration file (ntp.conf)

#server

# Miscellaneous stuff

logfile /var/log/xntpd
#precision -18                  # clock reading precision (usec)
driftfile /var/lib/ntp/ntp.drift        # path for drift file
statsdir /var/log/ntpstats/     # directory for statistics files
statistics loopstats peerstats clockstats
filegen loopstats file loopstats type day enable
filegen peerstats file peerstats type day enable
filegen clockstats file clockstats type day enable

server gilbreth.ecn.purdue.edu
server ntp-2.cso.uiuc.edu
server ntp-2.mcs.anl.gov
server ntp-2.ece.cmu.edu
peer nosbox.febo.com

restrict 207.238.207.160

### Configuration section ###
server 127.127.20.0 prefer              # GENERIC NMEA
server 127.127.22.0                     # ATOM(PPS)

### Reference clock section ###
enable pps
```

54. [TACGPS:931] Silence is golden!

From: Alan Biddle <APBIDDLE@worldnet.att.net>
Date: Sat, 27 Dec 1997 15:24:17 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19971227212153.007c2610@postoffice.worldnet.att.net>
Rendered body type: text/plain

Hi,

I downloaded/installed TAC32 1.1.2 for use with a Garmin 20, and so far it
is working almost perfectly. However, at times the time display turns red,
and
when it does, there is a very annoying "plop" sound with each tick. I have
sound effects turned off. With sound effects turned on, I get a "clank"
sound which changes to the same "plop" when the display turns red.

The "plop" seems to be associated with periods of no fix. Any way to turn
it off?

Alan
WA4SCA

55. [TACGPS:932] RE: Silence is golden!

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sat, 27 Dec 1997 15:42:09 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <01BD12E6.8F654A40@rick.cnssys.com>
Rendered body type: multipart/mixed

[No readable text body. See the preserved original monthly archive.]
[Inline non-text content: multipart/mixed; 1,092 bytes]

56. [TACGPS:933] RE: Silence is golden!

From: apbiddle@worldnet.att.net (Alan Biddle)
Date: Sat, 27 Dec 1997 16:36:57 -0600 (CST)
To: tacgps@tapr.org

Message-ID: <34a58054.4233833@mailhost.worldnet.att.net>
Rendered body type: text/plain

Rick,

Yes, it is amazing that the until can have 5+ birds in view and still loose lock. However, still a good until for the price. Perhaps someday I will spring for the Motorola, when there is a definite need for it. Thanks for the info.

Alan

57. [TACGPS:934] TAPR DGPS Reference Station

From: "Steven R. Bible" <srbible@gate.net>
Date: Sat, 27 Dec 1997 16:48:52 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19971227174552.0080e510@pop.gate.net>
Rendered body type: text/plain

Though not entirely a precise timing topic, I thought subscribers of this SIG would be interested in hearing about a Differential GPS Reference Station that Doug KC3RL and I are working on.

To see some of the results of the testing goto

    http://www.tapr.org/~n7hpr/dgps/

I've posted scatter plots without and with DGPS using a Garmin GPS-20 and Motorola Oncore VP. I am pleasantly surprised at the results.

I am presently transmitting the corrections on 145.79 MHz (the APRS frequency) to the Jacksonville, FL area. I've already started a discussion on the APRS-FL SIG. All an amateur needs is a two meter receiver and TNC. This is very much like what Tom W3IWI has done in the Baltimore, MD area using a commercial DGPS reference station.

Doug and I are soon to go beta with the Reference Station in two weeks (give or take). We are looking towards February as the release data of a kit sold by TAPR.

- Steve, N7HPR
(n7hpr@tapr.org)

58. [TACGPS:935] RE: Silence is golden!

From: mikebw@bilow.bilow.uu.ids.net (Mike Bilow)
Date: Sat, 27 Dec 1997 17:00:46 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <4a581681@bilow.bilow.uu.ids.net>
Rendered body type: text/plain

Richard M. Hambly wrote in a message to Mike Bilow:

 RMH> The actions you describe are by design. I do have an action
 RMH> item to = allow the user to disable the out-of-lock tone in
 RMH> the next release. = Tom's people at NASA insisted on the
 RMH> warning tone and display. It is = important to them to know
 RMH> when the GPS receiver is not tracking enough = satellites
 RMH> for the chosen mode. It is interesting that the Garmin does
 RMH> = this so often. The Motorola almost never falls out of
 RMH> lock.

The older Garmin receivers based on the PhaseTrac8 engine are much more prone to this than the newer Garmin receivers based on the MultiTrac12 engine. This subject has been discussed here before, but it is worth repeating in this context. Since the signals come down in distinct pseudorandom sequences, it is a matter of processing power that differentiates the engines, not so much the respective RF receivers.

 RMH> ------ =_NextPart_000_01BD12E6.8F761320
 RMH> Content-Type: application/ms-tnef
 RMH> Content-Transfer-Encoding: base64

 RMH> eJ8+Ih0VAQaQCAAEAAAAAAABAAEAAQeQBgAIAAAA5AQAAAAAAADoAAEIgAcA
 RMH> GAAAAElQTS5NaWNy
 RMH> b3NvZnQgTWFpbC5Ob3RlADEIAQ2ABAACAAAAAgACAAEEkAYAgAEAAAEAAAAQ
 RMH> AAAAAwAAMAIAAAAL

It might be a good idea to suppress this on your outgoing mail.

-- Mike

59. [TACGPS:936] Re: XNTPD & TAC & Linux

From: Jeremy Bishop <jeremyb@canb.auug.org.au>
Date: Sat, 27 Dec 1997 18:21:43 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199712280016.LAA08852@pcug.org.au>
Rendered body type: text/plain

John Ackermann N8UR <jra@febo.com> writes:
>
> I have my Linux system and TAC configured so things *should* work, but
> I'm still dazed and confused.

Welcome to the club :-)

> I'm using the generic nmea driver, and when I start the system it
> appears to be grabbing
> RMC sentences, but after four or five polls I start seeing "no
> response" when I query the
> clockstat info in xntpdc.

Yes, I've seen this as well - haven't tracked it down yet. I'm fairly
sure it's a problem on the xntpd side (rather than the receiver), but
xntpd is a complex beastie and I haven't devoted too much time too this
problem yet.

> At first I thought maybe there was too much activity on the serial
> port, so I turned off
> all the other Motorola output sentences, but still I have this problem.
>
> I've yet to see xntpd sync to the nmea driver, or establish sync with
> the PPS signal. Any
> suggestions?

Below is my ntp.conf file and a short description of how I got it working.
YMMV, as they say!

> Setup: Linux 2.0.33, xntpd3-5.91, both with PPSkit-0.3.4 patches
> installed. No, I'm not
> running the Oncore in 0D mode -- the RMC sentences are banging out very
> nicely. I've
> softlinked /dev/gps0 and /dev/pps0 to /dev/ttyS2, which is where the
> TAC is connected.
>
> Attached, for what it may be worth, is my ntp.conf file.

<...>
> server gilbreth.ecn.purdue.edu
> server ntp-2.cso.uiuc.edu
> server ntp-2.mcs.anl.gov
> server ntp-2.ece.cmu.edu
> peer nosbox.febo.com
>
> restrict 207.238.207.160
>
> ### Configuration section ###
> server 127.127.20.0 prefer   # GENERIC NMEA
> server 127.127.22.0   # ATOM(PPS)
>
> ### Reference clock section ###
> enable pps

OK, here's the ntp.conf that worked for me (sans irrelavent options):

```
----------
#
# Use GPS/NMEA clock and local clock support
#

server          127.127.20.1 prefer             # GPS/NMEA clock
fudge           127.127.20.1 time1 0.625        # Offset
fudge           127.127.20.1 flag3 1            # PPS processing

server          127.127.22.1 prefer             # ATOM (PPS) clock

server          127.127.1.1 prefer              # Local clock
fudge           127.127.1.1 stratum 8           # Local stratum
```

enable pps

In comparison to your ntp.conf, I note:

- you are already syncing to some external references, whereas mine is
  purely 'standalone'.

- I have 3 refclocks configured - NMEA, ATOM (PPS), and LOCAL.

- After trial and error, I ended up adding the 'prefer' flag to all 3
  clocks. I'm still not sure why this works or is neccessary, but it
  works for me.

To start from a known good receiver configuration, I initially boot DOS
and run SHOWTIME to make sure the Oncore is correctly configured; I then
exit showtime and reboot to Linux ...

When I start xntpd, I see this sequence of events:

After ~5 polls, xntpd syncs with the NMEA clock, and typically 'steps' the
time - sync is lost. A few minutes later it syncs with the local clock, and
later back to the NMEA clock. Once the NMEA/local clock combo are running
smoothly (with the NMEA-LOCAL offset less than 128ms, the ATOM clock will
kick in, and when its dispersion figure is low enough, xntpd will sync
with the ATOM clock.

Here's an extract from /var/adm/messages which shows this:

```
Dec 24 08:27:58 mushy xntpd[3333]: xntpd 3-5.91 Sun Dec 21 17:24:50 EST 1997 (5)
Dec 24 08:27:58 mushy xntpd[3333]: tickadj = 5, tick = 9997, tvu_maxslew = 495,
est. hz = 100
Dec 24 08:27:58 mushy xntpd[3333]: precision = 20 usec
Dec 24 08:27:58 mushy xntpd[3333]: refclock_ioctl: PPS detect on fd 7
Dec 24 08:27:58 mushy xntpd[3333]: read drift of -21.398 from /etc/ntp.drift
Dec 24 08:32:16 mushy xntpd[3333]: synchronized to GPS_NMEA(1), stratum=0
Dec 24 08:32:16 mushy xntpd[3333]: time reset (step) 0.265367 s
Dec 24 08:32:16 mushy xntpd[3333]: synchronisation lost
Dec 24 08:36:33 mushy xntpd[3333]: synchronized to LOCAL(1), stratum=8
Dec 24 08:36:33 mushy xntpd[3333]: kernel pll status change 307
Dec 24 08:37:37 mushy xntpd[3333]: kernel pll status change 18f
Dec 24 08:39:45 mushy xntpd[3333]: kernel pll status change 307
Dec 24 08:40:48 mushy xntpd[3333]: synchronized to GPS_NMEA(1), stratum=0
Dec 24 08:40:48 mushy xntpd[3333]: kernel pll status change 38f
Dec 24 08:41:52 mushy xntpd[3333]: synchronized to ATOM_PPS(1), stratum=0
Dec 24 08:42:56 mushy xntpd[3333]: kernel pll status change 18f
Dec 24 08:44:00 mushy xntpd[3333]: kernel pll status change 38f
Dec 24 08:45:04 mushy xntpd[3333]: kernel pll status change 307
Dec 24 08:48:16 mushy xntpd[3333]: kernel pll status change 307
Dec 24 08:52:32 mushy xntpd[3333]: kernel pll status change 307
<...etc...>
```

Hopefully that's enough to get you going. I'll send you my 'ZDA' hacked
driver in seperate email.

Regards,
Jeremy.

--
Jeremy Bishop
jeremyb@canb.auug.org.au
Australian Unix User Group (AUUG) Canberra Chapter

60. [TACGPS:937] RE: Silence is golden!

From: mikebw@bilow.bilow.uu.ids.net (Mike Bilow)
Date: Sat, 27 Dec 1997 21:49:12 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <4a5c3442@bilow.bilow.uu.ids.net>
Rendered body type: text/plain

Alan Biddle wrote in a message to Mike Bilow:

> AB> Yes, it is amazing that the until can have 5+ birds in view
> AB> and still loose lock. However, still a good until for the
> AB> price. Perhaps someday I will spring for the Motorola, when
> AB> there is a definite need for it. Thanks for the info.

It is unusual to lose lock with four or more satellites in view, but this can occur on any brand and model of receiver when the satellites happen to be aligned in an awkward position. For example, if you have a lot of satellites all in an apparent straight line from your perspective, triangulation is impossible no matter how many satellites you can see and how well your equipment can receive them. I see this from time to time.

-- Mike

61. [TACGPS:938] Some comments on TAC32

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Sun, 28 Dec 1997 00:33:38 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <34A5F295.892FC9C9@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

I'm really pleased with the progress Rick has made on the 32-bit TAC32 code. It was just 3 years ago -- sitting at the in-laws with a laptop over the Xmas holidays -- that I hacked the first version of SHOWTIME. Rick's code has now transported 99-44/100% of the functionality that evolved in numerous versions of SHOWTIME into TAC32. The only SHOWTIME functions that seem to be lacking are logging of the rcvr's messages into a disk file and the "stopwatch" that shows the time within the second that particular messages arrived. I put in both of these for debugging purposes, so their loss is probably unimportant.

Let me make a few comments on the latest version of TAC32:

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

For Alan, WA4SCA -- Rick added the "make the user aware that the rcvr is unlocked" functionality I built into SHOWTIME by adding the "plop plop" sounds and the red digits. In SHOWTIME, the user has the option of hitting the [N]oise key to disable the alarm, but every time the program is restarted, the switch defaults to the Alarm=ON position.

As others have noted, the ONCOREs are so robust that the ONLY time I've seen then get unlocked is when there is a power failure, a lightning zap, or when the antenna was covered with 12" of snow. Alas, the GPS-20s are not so robust. I have seen it happen a number of times each day that the rcvr will "shuffle" the satellite assignments and lose lock. It isn't just that the NMEA message goes away, but also the 1PPS undergoes a couple of microsecond transient when this happens. And the GPS-20 is pretty slow to re-lock when this happens. This is precisely the reason that I cannot recommend the use of the GPS-20 engine for critical timing applications -- it simply is not very robust!

Rick -- I'd suggest that maybe you have a switch to disable the "plop" sounds, but I'd recommend that you preserve the red digits display whenever the NMEA messages indicate that the rcvr is unlocked in the next version.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

Concerning RAIM: Rick has carried the RAIM implementation further than I ever attempted in SHOWTIME. I spot one small error -- on the RAIM setup screen, the minimum value is shown as 250 nsec, but the minimum that can be set is 300 nsec. The T<300 nsec regime in Rick's HELP notes requires 8 satellites!

I tried the "Kill 1PPS on fail" switch on an ONCORE with Rev 8.4 firmware it did nothing. I suspect that feature was not added until the most recent code. And RAIM was not supported at all before Rev 8.0. I haven't yet tried an older rcvr to see if the box is "grayed out" for the older units.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

Rick -- a couple of small "creeping features" I'd suggest:

-- On the Rcvr Setup screen, you have added the enable/disable specific satellites buttons. The buttons are green for the satellites currently in lock. Once a satellite has set and is no longer green, howz about leaving it shaded in some other color. Then, after a half-day of operation, you have a record of which satellites are in the current constellation!

-- On the rcvr/timing/manual position/averaging Data screens, howz about

adding a HELP button that takes you to the help file for that screen?

-- When you stretched the "S-meter" to show S/N to zero, you failed
to make the 10 | 20 | 30 scale match the new S/N scale.

-- The new UTC/PC/LMST/GMST switch is nice. A couple of times when TAC32
started, it was in a mode that wasn't what what I had displayed the last
time. I suspect that the pointer isn't being saved in the registry.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

GPS-25: TAPR has started offering the GPS25 as a GPS20 replacement.
I have yet to get my hands on one to verify that the TAC-2 board and
the software work OK with it. One thing I glean from the GPS25 specs
-- the hardware 1PPS is narrow (I believe 10 usec, just like the Trimble
SK8). I tried to define the TAC hardware spec as having a pulse in
the 0.1 to 0.2 second range. The circuit board has U5 as an optional
CMOS 555 one-shot pulse stretcher. If anyone has a GPS-25 on a TAC-2
board, I'd sure like to hear how it works. And Rick & I would like
feedback on anyone who has tried a Trimble SK-8 with SHOWTIME & TAC32.

73 and Happy New Year -- Tom

62. [TACGPS:939] RE: Some comments on TAC32

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sun, 28 Dec 1997 09:26:57 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <01BD137A.A4FCA300@rick.cnssys.com>
Rendered body type: multipart/mixed

[No readable text body. See the preserved original monthly archive.]
[Inline non-text content: multipart/mixed; 4,734 bytes]

63. [TACGPS:940] Update on xntpd/TAC/Linux

From: John Ackermann N8UR <jra@febo.com>
Date: Sun, 28 Dec 1997 09:51:01 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199712281547.KAA15307@meow.febo.com>
Rendered body type: text/plain

Thanks to a bunch of help from Jeremy Bishop, I now have my TAC
talking to xntpd, using his patched NMEA driver that supports
the ZDA sentence.

Let's just say that the documentation for xntpd leaves something
to be desired in this area...

I *think* the problem was not having the "fudge flag 3" turned on for
both the NMEA and ATOM servers. Jeremy also marked both servers
as "prefer".

One interesting question that I haven't answered yet is what is the
correct time delay to use on the NMEA serve. Jeremy's sample config
had quite a long value (I think 0.625 seconds) while I've gotten closer
to the mark with a much shorter one -- right now, I'm using 0.008.
But right now I'm also outputting *only* the ZDA sentence; with a
full output, the delay needed may change significantly.

Below, for any of you who care to read it, is the output from several
of the xntpd programs after an uptime of about four hours (the
##%$*&^ log rotating program in cron restarted xntpd at 6 this morning).

73,

John
jra@febo.com

- ----------------------
The kernel pps statistics from "xntpdc kerninfo" are:

pll offset: 3025 us
pll frequency: -67.177 ppm
maximum error: 91968 us
estimated error: 86368 us
status: 0107
pll time constant: 4
precision: 1 us
frequency tolerance: 200 ppm
pps frequency: -67.033 ppm

```
pps stability:        0.020 ppm
pps jitter:           44 us
calibration interval: 256 s
calibration cycles:   355
jitter exceeded:      26
stability exceeded:   13
calibration errors:   10

Those last three error counts were all in the first hour or so of
operation, and haven't incremented since.

Here's "xntpdc sysinfo":

system peer:          ATOM_PPS(0)
system peer mode:     client
leap indicator:       00
stratum:              1
precision:            -16
root distance:        0.00000 s
root dispersion:      0.08667 s
reference ID:         [PPS]
reference time:       b850edf4.01c182ec  Sun, Dec 28 1997 10:25:40.006
system flags:         auth monitor pll pps stats kernel_sync pps_sync
frequency:            -16.000 ppm
stability:            10.902 ppm
broadcastdelay:       0.003906 s
authdelay:            0.000122 s


Finally, here's the output of "ntpq -p":

     remote           refid      st t when poll reach   delay   offset
  disp
==============================================================================
======
+GPS_NMEA(0)     .GPS.            0 l   51   64  377     0.00  -111.36
  8.45
oATOM_PPS(0)     .PPS.            0 l   51   64  377     0.00   -6.883
  0.11
 LOCAL(0)        LOCAL(0)         8 l   50   64  377     0.00    0.000
 10.01
 xenia.gw.uiuc.e coyote.gw.uiuc.  3 u  473 1024  377   199.95   -3.147
 41.46
 antares-10.mcs. uwm.edu          3 u  475 1024  377   189.74    0.631
 29.07
 FS3.ECE.CMU.EDU SHADOW.ECE.CMU.  3 u  496 1024  377   226.17  -29.825
 23.67




- --KAA15103.883323054/meow.febo.com--

------- End of Forwarded Message
```

64. [TACGPS:941] Re: XNTPD & TAC & Linux

From: Randolph Bentson <bentson@grieg.holmsjoen.com>
Date: Sun, 28 Dec 1997 14:28:58 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199712282024.MAA13910@grieg.holmsjoen.com>
Rendered body type: text/plain

```
John Ackermann N8UR <jra@febo.com> wrote:
..
> I'm still dazed and confused.

> I'm using the generic nmea driver, and when I start the
> system it appears to be grabbing RMC sentences, but after
> four or five polls I start seeing "no response" when I
> query the clockstat info in xntpdc.

I'm running the Garmin GPS25SL (from the GPS30PC).  I'm
running 2.0.32 kernel and 3-5.91 xntpd with patches.  My
config file contains:

  server 127.127.1.0              # local refclock
  fudge 127.127.1.0 stratum 7
```

```
  server 127.127.22.0  prefer   # ATOM(PPS)

  server 127.127.20.0  prefer    # local refclock  GPS
  fudge 127.127.20.0 time1 0.240 #
  fudge 127.127.20.0 flag3 1    # enable PPS processing (for ATOM)
```

Notice I've had to set an offset for the GPS clock. I don't recall the xntpd code, but it may be rejecting the clock because it's too far off. You may have to apply an offset with the Motorola device as well. Just run it as a high-stratum device for a while to figure out the best value.

Randolph Bentson

65. [TACGPS:942] Re: XNTPD & TAC & Linux

From: mikebw@bilow.bilow.uu.ids.net (Mike Bilow)
Date: Sun, 28 Dec 1997 18:15:34 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <4a6d3e46@bilow.bilow.uu.ids.net>
Rendered body type: text/plain

Randolph Bentson wrote in a message to Mike Bilow:

```
 RB> I'm running the Garmin GPS25SL (from the GPS30PC).
```

I was under the impression that the thing inside the GPS30 was a GPS20?

-- Mike

66. [TACGPS:943] Update on xntpd/TAC/Linux

From: mikebw@bilow.bilow.uu.ids.net (Mike Bilow)
Date: Sun, 28 Dec 1997 18:21:57 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <4a6d3e41@bilow.bilow.uu.ids.net>
Rendered body type: text/plain

John Ackermann N8UR wrote in a message to Mike Bilow:

```
 JAN> - ----------------------
 JAN> The kernel pps statistics from "xntpdc kerninfo" are:

 JAN> pll offset:           3025 us
 JAN> pll frequency:        -67.177 ppm
```

It's really unusual to see a Linux machine with a negative PLL frequency, at least in my experience. I have a stratum 2 machine running that is eventually going to get the TAC-2 connected once we get an antenna problem cleared up, and it free-runs between +12 and +15 ppm depending upon ambient temperature, although it can ride up as high as +18 ppm when the tape drive is in use for extended periods of time. (You can see it as TIMEKEEPER.BILOW.COM if you are interested.) While different machines have different PLL frequencies, they generally tend to be positive.

```
 JAN> maximum error:        91968 us
 JAN> estimated error:      86368 us
```

This is also unusual. My stratum 2 machine tends to be +/- 25 ms, and that is with sources entirely over the net. It's running stock xntpd 3.5-91 on Linux kernel 2.0.29.

-- Mike

67. [TACGPS:944] Re: Update on xntpd/TAC/Linux

From: John Ackermann N8UR <jra@febo.com>
Date: Sun, 28 Dec 1997 18:44:11 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199712290040.TAA20224@meow.febo.com>
Rendered body type: text/plain

Mike Bilow wrote:

```
>
> John Ackermann N8UR wrote in a message to Mike Bilow:
>
>  JAN> - ----------------------
>  JAN> The kernel pps statistics from "xntpdc kerninfo" are:
>
>  JAN> pll offset:           3025 us
```

> JAN> pll frequency: -67.177 ppm
>
> It's really unusual to see a Linux machine with a negative PLL frequency, at
> least in my experience. I have a stratum 2 machine running that is eventually
> going to get the TAC-2 connected once we get an antenna problem cleared up, and
> it free-runs between +12 and +15 ppm depending upon ambient temperature,
> although it can ride up as high as +18 ppm when the tape drive is in use for
> extended periods of time. (You can see it as TIMEKEEPER.BILOW.COM if you are
> interested.) While different machines have different PLL frequencies, they
> generally tend to be positive.

I have two Linux boxes, and they both run at -60 to -70 ppm. Theyre'
in a
relatively cool basement, and meow (the machine I quoted the stats
from) currently
has its covers off, so I presume it will warm up some when I put the
skins back on.
I don't have any other experience to draw on.

> JAN> maximum error: 91968 us
> JAN> estimated error: 86368 us
>
> This is also unusual. My stratum 2 machine tends to be +/- 25 ms, and that is
> with sources entirely over the net. It's running stock xntpd 3.5-91 on Linux
> kernel 2.0.29.

I'm not sure what to make of these numbers -- except to say that this
data
came from about four hours of running time. I've been too busy
puttering
with things to get a long a run to see what the value stabilizes to,
but I hope
to do that over the next couple of days.

John

68. [TACGPS:945] Re: TAC32 Version 1.1.2 is available

From: "Ronald G. Parsons" <w5rkn@amsat.org>
Date: Sun, 28 Dec 1997 20:02:55 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <34A703A3.AB89171C@amsat.org>
Rendered body type: text/plain

Rick,

I borrowed a GPS antenna for my GPS 20 for my TAC.

Not much luck using TAC32 1.1.2

Hardware configuration is PowerMacintosh 7200/120 PC Compatible.
This contains a 100 MHz Pentium running Windows 95.

The TAC puts out a 100 msec positive pulse on both DCD (DE9-1, DB25-8)
and CTS (DE9-8, DB25-5). The pulse starts as soon as at least a 2-D fix
is obtained.

The "Satellites" panel on the right appears to work properly.
The Serial port is set for 1pps on CTS.

The "Grid Square" shows correctly EM10ci78

No other fields on the left show data except "Latency" shows 0
and "Display" shows UTC.

Richard M. Hambly wrote:
>
> All TAC32 testers,
>
..
>
> New Features:
>
> * The 1 PPS timing mark signal may now be connected to DCD, DSR or CTS
..

--
Ron W5RKN

also:

rparsons@bga.com

69. [TACGPS:946] Re: TAC32 Version 1.1.2 is available

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sun, 28 Dec 1997 20:36:06 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <01BD13D8.838A8940@rick.cnssys.com>
Rendered body type: multipart/mixed

[No readable text body. See the preserved original monthly archive.]
[Inline non-text content: multipart/mixed; 1,098 bytes]

70. [TACGPS:947] Re: XNTPD & TAC & Linux

From: Randolph Bentson <bentson@grieg.holmsjoen.com>
Date: Mon, 29 Dec 1997 04:00:19 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199712290959.BAA17590@grieg.holmsjoen.com>
Rendered body type: text/plain

> Randolph Bentson wrote in a message to Mike Bilow:
> RB> I'm running the Garmin GPS25SL (from the GPS30PC).
> I was under the impression that the thing inside the GPS30 was a GPS20?

Duh! A slip of the mind, caught deftly by MB.

71. [TACGPS:948] RE: Some comments on TAC32

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Mon, 29 Dec 1997 17:18:38 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <01BD1485.EBD73F40@rick.cnssys.com>
Rendered body type: multipart/mixed

[No readable text body. See the preserved original monthly archive.]
[Inline non-text content: multipart/mixed; 6,872 bytes]

72. [TACGPS:949] A TAC/XNTPD Observation

From: John Ackermann N8UR <jra@febo.com>
Date: Tue, 30 Dec 1997 08:27:41 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199712301426.JAA00765@meow.febo.com>
Rendered body type: text/plain

As I think Jeremy pointed out, and Tom explained, in earlier messages,
the jitter on the NMEA
clock in xntpd is pretty awful unless you have the TAC set to send
nothing but the ZDA sentence. The problem isn't so much that it varies
from one poll to another, but that over time there are massive jumps of
100ms or more. As Tom pointed out, this is probably due to the number
of sentences changing as the number of satellites in view changes.

One of the problems is that xntpd gets very unhappy if the NMEA and
ATOM (1 pps) clocks are more than 128ms apart. It's very easy for that
much spread to occur.

The way to cure this is probably to modify the refclock_nmea driver to
use the DCD line for its timing point, not the end of the ZDA sentence.
 I *think* this shouldn't be too hard to do using the CIOGETEV ioctl
and I'm going to see if I can do it, but I'm probably not enough of a C
hacker to make it work.

John

73. [TACGPS:950] Improved xntpd GPS driver (almost) available

From: John Ackermann N8UR <jra@febo.com>
Date: Tue, 30 Dec 1997 13:43:47 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199712301942.OAA02083@meow.febo.com>
Rendered body type: text/plain

Well, amazingly enough, I was able to create a reference clock driver
for xntpd that uses the Oncore's 1pps signal to set the time mark.
It's been running for about three hourse now and here's the ntpq output:

```
meow# ntpq -p
     remote           refid      st t when poll reach   delay   offset
  disp
==============================================================================
======
```

```
+GPS_NMEA(0)     .GPS.            0 l   58   64  377     0.00   50.050
  1.21
oATOM_PPS(0)     .PPS.            0 l   57   64  377     0.00   49.975
  0.78
+ntp2.usno.navy. .USNO.           1 u   38   64  377   179.46   55.885
 12.37
-navobs1.gatech. .USNO.           1 u  398 1024  377   289.49  103.360
 36.22
x204.34.198.40   0.0.0.0          1 u  236 1024  377   509.46  -47.445
 80.14

Note how closely the GPS and ATOM offsets correspond -- and that's with
no fudged-in delay.

There's what I think is a cosmetic bug that I want to fix, and I want
to let it run for a day or more to make sure that things really settle
down, but after that I'll make the driver available from ftp.febo.com.
I'll post another message when I put it there.

I've also asked the NTP folks what needs to be done to register a new
refclock type so we can have a "refclock_tac" instead of simply hacking
on the generic nmea driver (each reference clock type
is assigned a unique identifier in the xntpd code, and I don't want to
just randomly add one).

BUT --  Even though this hack seems to work, I discovered something
very interesting along the way.  I stole the PPS time mark code from
the Magnavox 4200 driver, which is a very sophisticated implementation
that includes (I think) the guts of SHOWTIME in its filter -- Tom and
the TAC are mentioned in the comments!.

I strongly suggest that rather than building from the generic NMEA
driver as I did, the better approach would be to start from the
Magnavox driver.  I believe that it would take mainly changes to the
sentence parsing and initialization stuff to convert the Magnavox
driver for the TAC -- someone familiar with the Motorola proprietary
sequences could probably do it pretty easily.

I think the end result would be much better if we start from the
Magnavox driver.  Volunteers?

John
```

74. [TACGPS:951] Re: Improved xntpd GPS driver (almost) available

From: Jeremy Bishop <jeremyb@canb.auug.org.au>
Date: Tue, 30 Dec 1997 17:39:12 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199712302337.KAA27469@pcug.org.au>
Rendered body type: text/plain

John Ackermann N8UR <jra@febo.com> writes:

<... results of John's "new, improved" driver snipped ...>

> There's what I think is a cosmetic bug that I want to fix, and I want
> to let it run for a day or more to make sure that things really settle
> down, but after that I'll make the driver available from ftp.febo.com.
> I'll post another message when I put it there.

Please do - I'll be happy to try it out.

> I've also asked the NTP folks what needs to be done to register a new
> refclock type so we can have a "refclock_tac" instead of simply hacking
> on the generic nmea driver (each reference clock type
> is assigned a unique identifier in the xntpd code, and I don't want to
> just randomly add one).

Actually, I have an old version of xntpd, version 3.5a, that has references
to what I presume was the older 6-channel Oncore, i.e.

```
./include/ntp.h:#define REFCLK_GPS_MOTO    21      /* Motorola GPS clock */
./lib/clocktypes.c:     { REFCLK_GPS_MOTO, "Motorola Six Gun GPS Receiver (21)",
```

However, all the code does is use the NMEA driver if you select the MOTO
driver. I think that what happened was a number of different drivers were
developed for various GPS receivers around that time, but given that they
all did essentially the same thing - parse an ASCII NMEA sentence for the
timecode, someone took the logical step of combining them into a generic
NMEA driver.

The bottom line is that you should be able to define refclock_tac as type
21. IMHO, we should call it "refclock_oncore", since we want to use the
Oncore's 0-D precision time mode (and perhaps things like the Time RAIM
support?).

> BUT -- Even though this hack seems to work, I discovered something
> very interesting along the way. I stole the PPS time mark code from
> the Magnavox 4200 driver, which is a very sophisticated implementation
> that includes (I think) the guts of SHOWTIME in its filter -- Tom and
> the TAC are mentioned in the comments!.

One of the neat things the Magnavox 4200 driver does is after running
in 3-D mode for 24 hours to calculate its reference position, it then
loads the reference positions as the position-hold parameters and then
switches to 0-D mode for improved timekeeping.

> I strongly suggest that rather than building from the generic NMEA
> driver as I did, the better approach would be to start from the
> Magnavox driver. I believe that it would take mainly changes to the
> sentence parsing and initialization stuff to convert the Magnavox
> driver for the TAC -- someone familiar with the Motorola proprietary
> sequences could probably do it pretty easily.

Drat! You beat me to it! I found this as well, and had the same idea. I
was waiting until I got to grips with the Motorola proprietary binary
format, before announcing "I have a cunning plan" ((tm) Baldrick, from
the BlackAdder TV series).

> I think the end result would be much better if we start from the
> Magnavox driver. Volunteers?

Count me in.

Regards,
Jeremy

--
Jeremy Bishop
jeremyb@canb.auug.org.au
Australian Unix User Group (AUUG) Canberra Chapter

75. [TACGPS:952] Some GPS-30 experiences

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Tue, 30 Dec 1997 21:53:29 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199712310341.WAA26625@aus-f.mp.campus.mci.net>
Rendered body type: text/plain

End-of-year vacation, so Charlie, W4OQM, and I pulled out our GPS-30s. Here
are a few items/questions.

1.   The effect of sawing open the units made them work (!?)

We each got two GPS-30s. One of Charlie's units worked fine, as expected.
The second seemed a bit deaf--it would show some satellites but never lock
on (after more than ample time while under the same conditions as the other
unit). One of my units was noticeably lower in sat S/Ns compared to the
other unit, under identical conditions (or as close as I could make it). We
chose the inferior units to open up (to get at the 1 PPS signal).

To open them we found it necessary to saw around the periphery at the base
(plain 'ole hacksaw was all we had) as prying simply would not break the
cover loose. The solder joints on the shields for both units looked just
fine. When the units were plugged in both worked just fine--about the same
as the "good" units.

Might the rough handling of removing the covers "fixed" whatever problem was
present?

2.   Ground plane under unit is of little help (?)

We wondered if a metal ground plane (18" aluminum pizza pan) under the
GPS-30 improved the S/N. We put two units on top of Charlie's "bird-cage"
screen (fiberglass screening over the pool) where there is a good sky view.
One unit was on the pizza pan and the other bare. We read the $GPGSV
records and compared them, then repeated the measurement with the pan under
the other unit. The unit on top of the pan did not show consistently better
S/N's. The readings from each unit were within 10 seconds of each other so

changes in sat positions does not appear to be a factor.

It makes sense that the ground plane will make little difference. The patch antenna should give a reasonably hemispherical pattern with some minor lobes below the horizon (on a "free-space" unit). Putting a ground plane under the unit can only increase the gain due to the below-the-horizon-lobes, consequently the gain increase would be minor.

As a check, we turned the unit upside down (no pan of course). The sats with high elevation had lower S/N's than low elevation sats, as expected.

3. Antennas for the highest 1 PPS stability?

Out of curiosity we grabbed a 23 inch dia parabolic dish (mil surplus) and placed the GPS-30 (facing the dish) at the focal point (the mounting hastily rigged with cardboard and tape) so that we could quickly lift the GPS 30 out, turn it over, and thereby compare "dish ant" versus "bare unit." The results made sense. The theoretical gain of the dish was 16.4 dbi and we were getting 10-12 db increases versus the "bare" unit (the dish of course aimed at the sat). The dish was "deep" (5.5 inch depth), but even so the GPS-30 ant pattern is still too wide so the difference was in-range. This led to another issue.

For oscillator disciplining, i.e. best stability of the 1 PPS pulses, is it better to have strong signals from a few satellites, or many weaker signals from many satellites? For example, a quadrifilar helix can be designed for peak gain overhead or on the horizon (and a dish would obviously be too narrow). This reference describes the design variation:

"Quadrifilar conical helical antenna with travelling-wave current distribution" by Nakano H., Ikeda N. and Yamauchi J. In IEE Proceedings in Microwaves, Antennas and Propagation, Volume 144, No 1, February 1997.

This reference from:
Chris Hill <CRH_Telnet@bigpond.com> (by way of K4HN@amsat.org (Mike Branda))

Regards,

Don, W4DH

76. [TACGPS:953] Re: Some GPS-30 experiences

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Wed, 31 Dec 1997 00:00:12 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <34A9DE98.78D9C297@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Don Haselwood, W4DH wrote:

> [snipping the GPS-20surgery report]
> 2. Ground plane under unit is of little help (?)
>
> We wondered if a metal ground plane (18" aluminum pizza pan) under the
> GPS-30 improved the S/N. We put two units on top of Charlie's "bird-cage"
> screen (fiberglass screening over the pool) where there is a good sky view.
> One unit was on the pizza pan and the other bare. We read the $GPGSV
> records and compared them, then repeated the measurement with the pan under
> the other unit. The unit on top of the pan did not show consistently better
> S/N's. The readings from each unit were within 10 seconds of each other so
> changes in sat positions does not appear to be a factor.

I haven't seen the inside of the -30's, but let me offer one caution concerning the dielectrically loaded patch antennas. They are very narrow-band, Hi-Q devices.
The patch antenna element is about a half-wave long. It is dielectrically shortened
by a factor 1/sqrt(epsilon) where epsilon is the relative dielectric constant of
the substrate material (this factor is usually called the Velocity Factor when it
is applied to coax cables). The ceramic substrates used in patch antennas have epsilon in the 5-10 range, meaning that the patch is about a half or a third of it's "true" half-wave size. The GPS L1 wavelength is ~19 cm, meaning a half-wave
antenna in free space would be ~9.5 cm = ~4" in size. The typical loaded patch has a size in the 2" range.

Since the patch antenna is a Hi-Q resonant device, it has a narrow bandwidth,

often as small as ~10 MHz. The operating frequency is critically dependent on all the stuff around the antenna, and in particular on the thickness of the "radome" covering the antenna. I tested one Ball Bros. patch with a thin Lexan radome, and found that removing the covering changed the frequency ~15 MHz. Since the antenna was only 10 MHz wide, it simply would not work without the cover being in place! Caveat Emptor.

> It makes sense that the ground plane will make little difference. The patch
> antenna should give a reasonably hemispherical pattern with some minor lobes
> below the horizon (on a "free-space" unit). Putting a ground plane under
> the unit can only increase the gain due to the below-the-horizon-lobes,
> consequently the gain increase would be minor.
>
> 3.   Antennas for the highest 1 PPS stability?
>
> Out of curiosity we grabbed a 23 inch dia parabolic dish (mil surplus) and
> placed the GPS-30 (facing the dish) at the focal point (the mounting hastily
> rigged with cardboard and tape) so that we could quickly lift the GPS 30
> out, turn it over, and thereby compare "dish ant" versus "bare unit." The
> results made sense. The theoretical gain of the dish was 16.4 dbi and we
> were getting 10-12 db increases versus the "bare" unit (the dish of course
> aimed at the sat). The dish was "deep" (5.5 inch depth), but even so the
> GPS-30 ant pattern is still too wide so the difference was in-range. This
> led to another issue.

Remember that the GPS satellites are circularly polarized, and the patch is also circular (both RHCP). When you use an RHCP feed at prime focus of a dish, the single reflection reverses the polarization, giving you an LHCP antenna.

> For oscillator disciplining, i.e. best stability of the 1 PPS pulses, is it
> better to have strong signals from a few satellites, or many weaker signals
> from many satellites? For example, a quadrifilar helix can be designed for
> peak gain overhead or on the horizon (and a dish would obviously be too
> narrow). This reference describes the design variation:
>
> "Quadrifilar conical helical antenna with travelling-wave current
> distribution" by Nakano H., Ikeda N. and Yamauchi J. In IEE Proceedings in
> Microwaves, Antennas and Propagation, Volume 144, No 1, February 1997.
>
> This reference from:
> Chris Hill <CRH_Telnet@bigpond.com> (by way of K4HN@amsat.org (Mike Branda))

For the Garmin rcvrs, you >>MUST<< be tracking at least 4 satellites (or 3 if you force it into 2-D mode). Therefore narrowing the beamwidth will HURT. You want as many satellites as you can get! Various quirks of the GPS-20 engine restrict it's timing performance to a level ~0.5 to 1 usec.

For the ONCOREs, you can operate them in "zero-D" mode, requiring only one satellite to get time. If the DoD turned off SA, then it might work well to "target" a single satellite. [The DoD's policis is to have SA turned off on one
satellite, currently PRN15. But the rest of the constellation has SA turned on.

With the ONCOREs running in "zero-D" mode, we find that we can beat down the SA effects by a factor ~sqrt(N) by tracking N satellites. To see how much this improves timing, see my FTP site at URL

   ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/oso-d270.gif

to see the difference between timing under 3-D tracking vs "zero-D". The moral to this story is that the ONCORE also works >>MUCH<< better when it is tracking as many satellites as possible. With this, we can obtain ~20 to 30 nsec timing with the ONCOREs -- i.e. a factor ~25 or so better than for the GPS-20's!

The only exception to the "use all the satellites you can" rule is "common view"
time synchronization. Some of the national clock labs (NIST in Boulder and USNO in Washington) observe some specific satellites as specific times of the day. If you get pseudoranges on the same satellite at the same time, and do some data analysis on the results, you can get timing in the ~5 nsec range. Judah Levine @ NIST is using the ONCORE engine in this way. But its a fair amount of work to do better than the 20-30 nsec that we get with the ONCORE-based TACs.

Your question involved disciplined oscillators. If you are using a GPS-20 to steer an xtal for ~15 mins = ~1000sec and can trust the GPS timing to 1 usec, then
you could steer the oscillator to a fractional stability of ~(1 usec)/1000 sec or

about 1:10e9 -- i.e. ~1 Hz equivalent frequency at 1 GHz.

73, Tom

77. [TACGPS:954] Re: Improved xntpd GPS driver (almost) available

From: "Henk Uijterwaal (RIPE-NCC)" <henk@ripe.net>
Date: Wed, 31 Dec 1997 04:06:07 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <Pine.SUN.3.95.971231101203.21420B-100000@ncc.ripe.net>
Rendered body type: text/plain

On Tue, 30 Dec 1997, John Ackermann N8UR wrote:

> Well, amazingly enough, I was able to create a reference clock driver
> for xntpd that uses the Oncore's 1pps signal to set the time mark.
> It's been running for about three hourse now and here's the ntpq output:
>
> meow# ntpq -p
>   remote   refid   st t when poll reach   delay   offset
>   disp
> ==
> ======
> +GPS_NMEA(0)   .GPS.   0 l   58   64 377   0.00   50.050
>   1.21
> oATOM_PPS(0)   .PPS.   0 l   57   64 377   0.00   49.975
>   0.78
> +ntp2.usno.navy. .USNO.   1 u   38   64 377   179.46   55.885
> 12.37
> -navobs1.gatech. .USNO.   1 u 398 1024 377   289.49 103.360
> 36.22
> x204.34.198.40   0.0.0.0   1 u 236 1024 377   509.46 -47.445
> 80.14
>
> Note how closely the GPS and ATOM offsets correspond -- and that's with
> no fudged-in delay.

I'm not so sure if this is the best approach....

Getting a PPS into a machine is described in the NTP doc's. The first possibility is to use a so-called gadget box (which contains a subset of the TAC) and put 2 signals on your serial port: the PPS on the Carrier Detect and the time encoded in some format on the data lines. NTP then reads the time from the data lines and uses it to set the clock to approximately a second accuracy. It then uses ioctl() calls to look at the pps. Ioctl() can determine the arrival time of the pps within a few 10's of microseconds, this is then used to synchronize the clock further.

This is what your setup does. If you'd remove the 3 other servers (ntp2, navobs1, 204.34.198.40) from your setup, you'd see that your computer first syncs to GPS_NMEA (since it doesn't have a clue what the time is, and ATOM just looks at the PPS) and then ATOM would take over.

However, if you read on in the NTP doc's, you'll run across a reference to "A Kernel Model for Precision Timekeeping". This describes a model where you feed your PPS signal directly into the system kernel. Inside the kernel, there is a PLL to control the system clock at the system kernel level. This improves your accuracy by a few orders of magnitude.

Of course, this requires kernel modifications. When I looked at this, this summer, the kernel modifications were available as a patch to the then current Linux kernel. They may have made it into the official kernel since then, you should probably ask around in the Linux or NTP groups. In any case, you can always apply the patch yourself and recompile your kernel.

The patch also exists for FreeBSD. We're running that on some of our machines. We have a tiny program that is run just before xntpd is fired up that sends the appropriate commands to the TAC, then xntpd is fired up with just the NMEA driver. NTP then synchronizes the clock to the second level. Then the kernel PLL code takes over.

The NMEA driver that we use comes straight out of the box, which has the advantage that we don't have to maintain it. I once started to put a driver together that looked at the Motorola format, but gave up in it when I realized that it wouldn't give any improvement in accuracy.

Henk

```
Henk Uijterwaal                    Email: henk.uijterwaal@ripe.net
RIPE Network Coordination Centre     WWW: http://www.ripe.net/home/henk
Singel 258                         Phone: +31.20.535-4414,  Fax -4445
1016 AB Amsterdam                   Home: +31.20.6651962
The Netherlands                    Pager: +6.57626855
------------------------------------------------------------------------------

%DCL-E-NOCFFE, unable to locate coffee - keyboard input suspended.
```

78. [TACGPS:955] Re: Improved xntpd GPS driver (almost)

From: John Ackermann N8UR <jra@febo.com>
Date: Wed, 31 Dec 1997 07:13:30 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199712311312.IAA11225@meow.febo.com>
Rendered body type: text/plain

Henk wrote, about using the 1pps signal as part of the NMEA driver:

> I'm not so sure if this is the best approach....
>
> Getting a PPS into a machine is described in the NTP doc's. The first
> possibility is to use a so-called gadget box (which contains a subset of
> the TAC) and put 2 signals on your serial port: the PPS on the Carrier
> Detect and the time encoded in some format on the data lines. NTP then
> reads the time from the data lines and uses it to set the clock to
> approximately a second accuracy. It then uses ioctl() calls to look at
> the pps. Ioctl() can determine the arrival time of the pps within a few
> 10's of microseconds, this is then used to synchronize the clock further.
>
> This is what your setup does. If you'd remove the 3 other servers (ntp2,
> navobs1, 204.34.198.40) from your setup, you'd see that your computer
> first syncs to GPS_NMEA (since it doesn't have a clue what the time is,
> and ATOM just looks at the PPS) and then ATOM would take over.
>
> However, if you read on in the NTP doc's, you'll run across a reference to
> "A Kernel Model for Precision Timekeeping". This describes a model where
> you feed your PPS signal directly into the system kernel. Inside the
> kernel, there is a PLL to control the system clock at the system kernel
> level. This improves your accuracy by a few orders of magnitude.
>
> Of course, this requires kernel modifications. When I looked at this,
> this summer, the kernel modifications were available as a patch to the
> then current Linux kernel. They may have made it into the official kernel
> since then, you should probably ask around in the Linux or NTP groups.
> In any case, you can always apply the patch yourself and recompile your
> kernel.

I'm running with the kernel mods for precision time... some of them are
now standard in the 2.0.32+ kernels, but the patch is still needed to
support hardware PPS, as is a patch to the xntpd3-5.91 sources.
Everything is in Ulrich Windl's PPSkit-0.3.4 (I'll be putting together
a web page for the TAPR site that lists all the links for this stuff)..

The reason for trying to use the PPS signal on the GPS driver as well
as the atom driver (which as I understand it is the one that controls
the kernel time discipline) is that if the offset is too great between
the two is more than 128ms, the atom driver won't kick in.   Unless you
carefully adjust the GPS driver's t1 fudge factor, the offset between
the Oncore sentence output and the atom driver's 1pps is likely to be
far more than that.

And, even if you start out with the fudge factor bringing the two close
together, if the GPS output sentences change (more or fewer satellites
reported in the SVA (?) sentences), the offset can change dramatically
during a run.

Using the PPS signal as part of the GPS driver solves that problem --
it's not intended to replace the kernel time discipline, but just to
avoid that annoying offset. I don't *think* it adversely impacts the
operation of the kernel time discipline via the atom driver. Am I
wrong in that assumption?

John

79. [TACGPS:956] TAC32 Version 1.1.3 is available

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Wed, 31 Dec 1997 07:53:31 -0600 (CST)

To: tacgps@tapr.org
Message-ID: <01BD15C9.67F71DE0@rick.cnssys.com>
Rendered body type: multipart/mixed

[No readable text body. See the preserved original monthly archive.]
[Inline non-text content: multipart/mixed; 1,492 bytes]

80. [TACGPS:957] Re: Improved xntpd GPS driver (almost)

From: "Henk Uijterwaal (RIPE-NCC)" <henk@ripe.net>
Date: Wed, 31 Dec 1997 08:05:28 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <Pine.SUN.3.95.971231144215.21420G-100000@ncc.ripe.net>
Rendered body type: text/plain

On Wed, 31 Dec 1997, John Ackermann N8UR wrote:

> Henk wrote, about using the 1pps signal as part of the NMEA driver:

> The reason for trying to use the PPS signal on the GPS driver as well
> as the atom driver (which as I understand it is the one that controls
> the kernel time discipline)

No. The ATOM driver is intended for machines that have a PPS coming in
over the serial port but do not have kernel level support for a PPS. You
don't need it when you have kernel level PPS support. In our
/etc/ntp.conf, we have:

   enable pps
   server 127.127.20.0   prefer

so that NTP only has 1 peer, the GPS_NMEA driver:

```
xntpdc> peers
     remote           local      st poll reach  delay   offset    disp
==============================================================================
*GPS_NMEA(0)     127.0.0.1        0   64  377 0.00000  0.028797 0.00047
```

This synchronizes to the NMEA sentences, then the kernel level PLL kicks
in.

> is that if the offset is too great between
> the two is more than 128ms, the atom driver won't kick in.

This is correct. NTP knows that the ATOM driver is more accurate than the
NMEA driver, so it will try to use that one. However, the ATOM driver
only gives a pulse, not a timestamp. In order to get that, NTP looks at
the NMEA driver (or one of your other peers, for that matter), sets the
clock, then switches over. If there is to much difference between the
second marks of the 2, NTP assumes that one of them is wrong and doesn't
switch over. BTW, when we were experimenting with this, I never saw a
huge difference between ATOM and NMEA, ATOM just took over. This might be
an artefact of my setup though.

> And, even if you start out with the fudge factor bringing the two close
> together, if the GPS output sentences change (more or fewer satellites
> reported in the SVA (?) sentences), the offset can change dramatically
> during a run.

The satellites are reported in the GPGSA sentence:

```
  $GPGSP,m,X,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,PDOP,HDOP,VDOP
```

m=Mode (Manual or Automatic), X=1 for fix not available, 2 for 2D, 3 for
3D, xx are the satellite ID's.

Henk


```
--------------------------------------------------------------------------------
Henk Uijterwaal                   Email: henk.uijterwaal@ripe.net
RIPE Network Coordination Centre    WWW: http://www.ripe.net/home/henk
Singel 258                        Phone: +31.20.535-4414,  Fax -4445
1016 AB Amsterdam                  Home: +31.20.6651962
The Netherlands                   Pager: +6.57626855
--------------------------------------------------------------------------------
```


%DCL-E-NOCFFE, unable to locate coffee - keyboard input suspended.

81. [TACGPS:958] Re: Some GPS-30 experiences

From: Lyle Johnson <lylej@azstarnet.com>
Date: Wed, 31 Dec 1997 08:36:44 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19971231072908.0074a14c@pop.azstarnet.com>
Rendered body type: text/plain

```
>2.      Ground plane under unit is of little help (?)
>
>We wondered if a metal ground plane (18" aluminum pizza pan) under the
>GPS-30 improved the S/N.  We put two units on top of Charlie's "bird-cage"
>screen (fiberglass screening over the pool) where there is a good sky view.
>One unit was on the pizza pan and the other bare.  We read the $GPGSV
>records and compared them, then repeated the measurement with the pan under
>the other unit.  The unit on top of the pan did not show consistently better
>S/N's.  The readings from each unit were within 10 seconds of each other so
>changes in sat positions does not appear to be a factor.

I wouldn't have expected the S/N to get much better.  Usually a groundplane
under an otherwise good antenna will help with low-elevation multi-path.
Make the ground plane a choke-ring and you get even better rejection...

Lyle
```

82. [TACGPS:959] Re: Improved xntpd GPS driver (almost)

From: John Ackermann N8UR <jra@febo.com>
Date: Wed, 31 Dec 1997 08:42:59 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199712311437.JAA11960@meow.febo.com>
Rendered body type: text/plain

```
Henk wrote:

> No.  The ATOM driver is intended for machines that have a PPS coming in
> over the serial port but do not have kernel level support for a PPS.  You
> don't need it when you have kernel level PPS support.  In our
> /etc/ntp.conf, we have:

Ah, I didn't realize that.  Thanks.  I've found the (x)ntp docs to be
voluminous, but not very useful. :-)

That being the case, the changes to use pps sync with the NMEA driver
don't have the importance that I thought they did, but on the other
hand they still make the peers display look much nicer...

On a slightly different kernel time question, maybe you can explain a
couple of things about the "ntptime" display that confuse me (a sample
output is below):

1.   What does the "code 5 (ERROR)" message for ntp_gettime() and
ntp_adjtime() mean?  It's not always there, but most of the time it is.
 It's confusing because things seem to be working ok --  the "jitter
exceeded," "stability exceeded" and "errors" counters shown below
haven't incremented in at least twelve hours, while "intervals" counter
has.  The status "PPSJITTER" looks suspicious, but I don't know what
it's referring to -- the most recent sample?  And what's the criteria
for this?  On the previous invocation of ntptime, the "jitter" value
was 0us, yet the error 5 was still reported.

2.  What's the difference between the "frequency" listed at 33.281 ppm
(this is what's in ntp.drift) and the "pps frequency" listed at -66.089
ppm -- that seems like a very wide variation, but I have no idea what
it means.

Thanks,

John
----
meow# ntptime
ntp_gettime() returns code 5 (ERROR)
  time b854d54e.884cc000  Wed, Dec 31 1997  9:29:34.532, (.532421),
  maximum error 13336 us, estimated error 7936 us.
ntp_adjtime() returns code 5 (ERROR)
  modes 0x0 (),
  offset -1722 us, frequency 33.281 ppm, interval 256 s,
  maximum error 13336 us, estimated error 7936 us,
  status 0x307 (PLL,PPSFREQ,PPSTIME,PPSSIGNAL,PPSJITTER),
  time constant 4, precision 1 us, tolerance 200 ppm,
  pps frequency -66.089 ppm, stability 0.011 ppm, jitter 136 us,
  intervals 601, jitter exceeded 40, stability exceeded 141, errors 53.
```

83. [TACGPS:960] Re: TAC32 Version 1.1.3 is available

From: Kohjin Yamada <kohjin@cosmos.marina.prug.or.jp>
Date: Wed, 31 Dec 1997 13:53:29 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199712311943.EAA14010@cosmos.marina.prug.or.jp>
Rendered body type: text/plain

At 07:53 97/12/31 -0600, you wrote:

> GPS Receiver Parameters: The satellite activation table now highlights
both satellites being tracked (green) and those which were previously
tracked during the current session (cyan). This can be used to form a
picture of the currently active satellite constellation over a period of 12
hours.

Nothing different, just same as 1.1.2 in my system.
Satellites being tracked are all blue.

> Startup: Improved handling of the main clock type selection on program
start to reset the clock Registry to UTC if the Registry contains an
illegal value.

Nothing different, can't change clock type.

Kohjin, JR1EDE

84. [TACGPS:961] XNTPD/TAC web page

From: John Ackermann N8UR <jra@febo.com>
Date: Wed, 31 Dec 1997 14:05:42 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199712312001.PAA15175@meow.febo.com>
Rendered body type: text/plain

I've put pointers to the various ntp-related bits, as well as my
(plagiarized) nmea+pps driver file,
at http://www.febo.com/ntp. You can also grab the driver file directly
from ftp://ftp.febo.com/pub/linux_ham/refclock_nmea.c.gz.

If anyone has anything (information or links) they'd like to have added
to the page, just let me know. It's a work in progress.

John

85. [TACGPS:962] Some GPS-30 experiences

From: mikebw@bilow.bilow.uu.ids.net (Mike Bilow)
Date: Wed, 31 Dec 1997 15:33:31 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <4aa9fdfe@bilow.bilow.uu.ids.net>
Rendered body type: text/plain

Donald E. Haselwood wrote in a message to Mike Bilow:

 DEH> 1.   The effect of sawing open the units made them work (!?)

Mine worked a lot better when it was out of its case, too. I didn't think too
much about it. I did not have to saw the case, but simply cut along the weld
seam with a knife. It was tough going and probably would have been faster with
a saw, but the case opened right up.

 DEH> For oscillator disciplining, i.e. best stability of the 1
 DEH> PPS pulses, is it better to have strong signals from a few
 DEH> satellites, or many weaker signals from many satellites?

I don't have any evidence to back this up, but I would expect that the best
timekeeping occurs with the best positioning accuracy. Taking into account the
famous rule of thumb that the speed of light is about one foot per nanosecond,
then a positioning error of a few hundred feet results in a timekeeping error
of a few hundred nanoseconds. As a result, it is critical that the receiver be
able to get as accurate a position as possible.

Given the basic method of GPS operation, positioning accuracy is best when
based upon information from satellites as dispersed from each other as
possible. In practice, the ideal situation would be three satellites on the
horizon evenly spaced with regard to azimuth and one satellite at the zenith.
If you cut down your view of the sky with an antenna or because of obstruction,
then your positioning accuracy will be somewhat degraded.

The Oncore has a mode where you can tell it where it is and that it is not
actually moving, and then it will give you accurate time from a single

satellite. The Garmin cannot do this, as far as I know.

-- Mike

86. [TACGPS:963] Rockwell Zodiac and xntpd

From: Howard Goldstein <hgoldste@bbs.mpcs.com>
Date: Wed, 31 Dec 1997 16:09:10 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199712312206.RAA27901@bbs.mpcs.com>
Rendered body type: text/plain

Before I go about recreating wheels has anyone seen an xntpd reflock
driver for the Rockwell Zodiac board?

It seems perfect for this app being cheap, having 1PPS out and a
decent binary interface (and having a handful of them here in the shack
doesn't hurt either)

87. [TACGPS:964] Re: Some GPS-30 experiences

From: Brooks Shera <ebs@lanl.gov>
Date: Wed, 31 Dec 1997 16:09:24 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199712312207.PAA10299@newreg.lanl.gov>
Rendered body type: text/plain

Tom wrote:

>Your question involved disciplined oscillators. If you are using a GPS-20 to
>steer an xtal for ~15 mins = ~1000sec and can trust the GPS timing to 1 usec,
then
>you could steer the oscillator to a fractional stability of ~(1 usec)/1000
secor
>about 1:10e9 -- i.e. ~1 Hz equivalent frequency at 1 GHz.

I found this estimate a little simplistic since it ignores the low pass
filtering needed in disciplining an oscillator. The peak timing noise is
important and the GPS-20 is evidently inferior to the Oncore. But even
more important is the power spectrum of the noise.

If the noise is predominately at higher frequencies (in this context a
few
milliHz, i.e. periods of a few minutes) it is greatly attenuated by the
disciplining loop filter. The power spectrum can be estimated from data
comparing gps timing with that of a H maser or Cs standard, such as
the plot Tom refers to on his FTP site. The spectrum is important
because it
is directly relevant to loop filter design.

>From this reason I asked Tom to share the raw data for his plot with
the community (12/20/97), but so far with no result. :-(

It would make a nice holiday gift for those of us our are interested in
gps-disciplined oscillators.

73,

Brooks

88. [TACGPS:965] Pentium vs 486 for kernel PPS

From: John Ackermann N8UR <jra@febo.com>
Date: Wed, 31 Dec 1997 16:21:36 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199712312217.RAA16651@meow.febo.com>
Rendered body type: text/plain

Question for Henk, Jeremy, Randall, Mike, or anyone else who really
understands xntpd:

>From looking at the linux kernel PPS stuff, I learned that the Pentium
processor supports an additional clock register (or something...) that
allows much finer resolution in the timing procedures.   The 386/486
architecture it seems limited to resolutions of "less than 1
millisecond" as opposed to microsecond level in the Pentium.

Unfortunately, at the moment my Linux machines are 486DX2/100s.   Does
this explain why ntptime seems to frequently tell me that I'm in a
"PPSJITTER" error? Is my architecture simply unable to measure time
precisely enough to make the kernel pps discipline work properly?

If this is the case, is there any advantage to running the kernel pps
discipline over using the GPS and ATOM drivers alone?

John
jra@febo.com

89. [TACGPS:966] Re: TAC32 Version 1.1.3 is available

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Wed, 31 Dec 1997 16:41:41 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <01BD1613.5448F8A0@rick.cnssys.com>
Rendered body type: multipart/mixed

[No readable text body. See the preserved original monthly archive.]
[Inline non-text content: multipart/mixed; 1,671 bytes]

90. [TACGPS:967] Re: Pentium vs 486 for kernel PPS

From: Jeremy Bishop <jeremyb@canb.auug.org.au>
Date: Wed, 31 Dec 1997 17:17:24 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199712312311.KAA26474@pcug.org.au>
Rendered body type: text/plain

John Ackermann N8UR <jra@febo.com> writes:

> Question for Henk, Jeremy, Randall, Mike, or anyone else who really
> understands xntpd:

Err, you're implying that I _understand_ xntpd?! Please withdraw that
remark! Oh, yes, good morning and Happy New Year everyone (it's Jan 1st
down here!)!

> >From looking at the linux kernel PPS stuff, I learned that the Pentium
> processor supports an additional clock register (or something...) that
> allows much finer resolution in the timing procedures.   The 386/486
> architecture it seems limited to resolutions of "less than 1
> millisecond" as opposed to microsecond level in the Pentium.
>
> Unfortunately, at the moment my Linux machines are 486DX2/100s.   Does
> this explain why ntptime seems to frequently tell me that I'm in a
> "PPSJITTER" error? Is my architecture simply unable to measure time
> precisely enough to make the kernel pps discipline work properly?

I am currently running on my xntpd/TAC on a 486DX2/66, and see lots of
"PPSJITTER" errors reported by Ulrich Windl's "enable_pps" utility (I
haven't tried using "ntptime"). To get the correct answer I think you'll
need to ask Ulrich or someone else who really does understand the kernel
PPS stuff, but my gut feeling is that you're probably right - older,
slower CPU's and architectures probably don't have the resolution to
give "good" PPS resolution.

> If this is the case, is there any advantage to running the kernel pps
> discipline over using the GPS and ATOM drivers alone?

Yes, I think it's still worth doing. "user-land" is inherently slower
than "kernel-land", so it would seem that doing PPS processing in the
kernel is always going to be a win over doing it in a user application.

Cheers,
Jeremy

91. [TACGPS:968] WHOOPS !! Jan.1 is not Day #002!

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Wed, 31 Dec 1997 18:20:13 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <34AADFD8.12A6C761@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

New Years UTC just clicked over. Rick cloned my day conversions
from SHOWTIME in TAC32 and I see that Jan.1 is showing as UTC day
#002. Obviously something is wrong in my original code, and Rick
dutifully propagated my misteak -- sorry.

      "thirty days hath Septober, April, June and NoWonder!"

Rick -- I'll look at the code and get back to you RSN!

Happy New Year -- Tom

92. [TACGPS:969] TAC32 Version 1.1.4 is available

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Wed, 31 Dec 1997 21:12:00 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <01BD1638.DFF077A0@rick.cnssys.com>
Rendered body type: multipart/mixed

[No readable text body. See the preserved original monthly archive.]
[Inline non-text content: multipart/mixed; 953 bytes]

93. [TACGPS:970] Suggestion for MicE

From: Darryl Smith <vk2tds@ozemail.com.au>
Date: Wed, 31 Dec 1997 21:12:19 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <34AB083C.56367218@ozemail.com.au>
Rendered body type: text/plain

Hi there... Here is a thought for an addition for the MIC-E. How about
including a car over-speed alarm. The GPS provides an accurate speed
indicator. It would be a great selling point to a wife when trying to
justify it.

Darryl

January 1998

Original source file: tacgps.9801
Source: http://ftp.tapr.org/product_docs/TAC2/mail_archives/tacgps.9801

1. TAC32 and elevation?

From: Alan Biddle <APBIDDLE@worldnet.att.net>
Date: Sat, 17 Jan 1998 18:53:33 +0000
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980117185333.007b6730@postoffice.worldnet.att.net>
Rendered body type: text/plain

Hi,

First, please excuse the possible repeat message. I sent one last week,
and it was never answered, nor did I get a copy from the mailing list.

Anyway, about how TAC32 handles the elevation averaging? I have a Garmin
20, and there are frequent periods of "no fix" or "2-D" fix. At these
times, the average elevation is set to zero, unlike the lat/lon values.
The result is that no matter how long I accumulate data, the average value
is typically 50-60% of the the current data for the elevation, only.

Is this a bug, feature, or operator error?

Alan
WA4SCA

2. TAC32 Version 1.1.6 is available

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sat, 17 Jan 1998 16:01:46 -0500
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <01BD2361.38F93D20@rick.cnssys.com>
Rendered body type: text/plain

All TAC32 testers,

Version 1.1.6 of the TAC32 software is now available at http://www.cnssys.com/tac32/

Version 1.1.6, Jan 17, 1998: This version includes all of the outstanding suggestions and bug fixes that
 I have received from the beta testers.

New Features:

* TAC32 no longer stops reporting data when 1 PPS timing mark signal is halted by T-RAIM. This also
allows GPS receivers without the 1 PPS signal to use TAC32 to display data.
* DGPS output commands are now implemented on the GPS Receiver Mode Selection screen. At present TAC32
does not process the resulting data but this feature allows users to set up Motorola receivers that have
 DGPS output capability (binary mode only). This feature is primarily for use by the DGPS development
team.
* The satellite elevation column now includes up and down arrows to indicate rise and set trend.
* Added a new user interface for setting the PC Clock synchronization method. Added a new
synchronization method that allows the PC clock to be re-synchronized when the PC Clock drifts beyond a
user selectable number of milliseconds. Added "Time of Last Sync" window to the new "Set PC Clock"
window.
* Improved the reliability of detecting 6-channel vs. 8-channel Motorola receivers by dynamic testing
rather than relying on firmware revision level. This allows 6-channel receivers that have had firmware
upgrades to work correctly.
* Dynamically detect DGPS and T-RAIM capability.
* The main window status bar now shows more information about Motorola receivers (mode, number of
channels, and whether T-RAIM and/or DGPS options are available).
* Began the implementation of custom log types. Added a log type selector window to the New and Open
commands. Added a new log type, "Time, Position, Velocity, Etc.", to log PVT data in a spread sheet
friendly format. See Help for New and Open commands for more information.

Bug Fixes:

* Timing parameters are now set up correctly on program start up.
* The "Locked Since" time is now set correctly.
* Corrected an error that sometimes prevented all the satellites from being shown when the satellite
list was not sorted (no sort buttons depressed) in the Motorola binary mode.
* Corrected log time stamps for New, Open, and Save headers.

Rick
WB2TNL

3. Testing list too long silent

From: RHS Linux User <tapr@k4ziv.erols.com>
Date: Sat, 17 Jan 1998 18:00:03 -0500 (EST)
To: tacgps@tapr.org
Message-ID: <Pine.LNX.3.95.980117175845.22992A-100000@k4ziv.erols.com>
Rendered body type: text/plain

Have not heard this list in awhile, just a comm test, delete.
Russ

4. All quiet on tacgps list?

From: Jeremy Bishop <jeremyb@canb.auug.org.au>
Date: Sun, 18 Jan 1998 16:10:54 +1100 (EST)
To: tacgps@tapr.org
Message-ID: <199801180510.QAA13050@pcug.org.au>
Rendered body type: text/plain

Is the tacgps list still alive? The last message I had on the list was
nearly two weeks ago:

> From tacgps@tapr.org Mon Jan 5 19:42:50 1998
> Date: Mon, 5 Jan 1998 02:24:56 -0600 (CST)
> Originator: tacgps@tapr.org
> From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
> To: tacgps@tapr.org
> Subject: [TACGPS:993] What exactly does the inside of a GPS30PC look like ?
<...>

Have any of the NTP folks made further progress with xntpd and the Oncore?

Cheers,
Jeremy

5. TAC32 and elevation?

From: Alan Biddle <APBIDDLE@worldnet.att.net>
Date: Sun, 18 Jan 1998 11:39:34 +0000
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980118113934.007b6810@postoffice.worldnet.att.net>
Rendered body type: text/plain

Hi,

Apparently my previous posts got lost in the mailing list crash, so one
more time. :)

A question about how TAC32 handles elevation? I have noticed that during
periods of either "no fix" or "2-d fix" that the average value for
elevation, only, is set to zero. As a result, no matter how long I let it
accumulated data, the elevation value is only about 50-60 of the current
value. The lat/lon values don't do this.

Alan
WA4SCA

6. TAC32 Version 1.1.7 is available

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sun, 18 Jan 1998 17:57:03 -0500
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <01BD243A.7CC17C00@rick.cnssys.com>
Rendered body type: text/plain

All TAC32 testers,

Thanks to the quick work of one of our dedicated Beta testers (Tom!), Version 1.1.7 of the TAC32
software is now available at http://www.cnssys.com/tac32/

Version 1.1.7, Jan 18, 1998: This is a bug fix release.
* Dynamically size the receiver status frame in the status bar so the longest message fits regardless of
 the system font size in use.
* Allow the left frame of the status bar to shrink to zero when the main frame is made smaller (e.g., to
 show only the clock) so the more important status bar frames will stay visible.
* Added line break at the end of the spread sheet header line (line two) in the PVT log.
* Corrected a spelling error in the NMEA PVT log header.
* Made the clock red and properly update the PC time for receivers without 1 PPS, including Motorola
Oncores with 1 PPS disabled by T-RAIM.
* Timing dialog data now saved correctly.
* Added a PC Clock Sync counter to the Set PC Clock window (see Help for more information).
* Added Motorola firmware revision number to the status bar.
* Improved the reliability of Motorola NMEA results by ensuring a valid version number has been received

before switching to NMEA mode.
* Improved thread shutdown code to eliminate a rare error on program termination.

7. Better GPS-30 Antenna?

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Mon, 19 Jan 1998 14:25:46 -0500
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980119142546.007b0e40@appstate.campus.mci.net>
Rendered body type: text/plain

I didn't see this in the archives (and I was off the list), so here is a repost--

>Date: Mon, 12 Jan 1998 23:35:49 -0500
>To: tacgps@tapr.org
>From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
>Subject: Better GPS-30 Antenna?
>
>Is it worth pulling off the GPS-30 patch antenna and rigging up an antenna with more efficiency?
>
>Some investigation of the patch antenna literature indicates that they suffer from a) low bandwidth (due to high Q), and b) low efficiency (due to the dielectric). One electric fields book W4OQM had showed a chart of efficiency for patch antennas. We "eye-ball-interpolated" for an epsilon of 25 (the figure we estimate for the GPS-30 antenna dielectric) and it (roughly) showed a 10% efficiency. 10 db loss! Unless we slipped-a-cog and misinterpreted the chart it indicates that a quadrifilar helix or maybe a simple helix (say 1 1/2 turns) would improve reception considerably.
>
>I haven't pulled off the patch antenna, and I am a little reluctant to do so as it "works," however, if indeed the patch antenna is only 10% efficient it seems it would be worth digging in and giving some homebrew ants a try. Does this make sense?
>
>(BTW, Tom Clark's Yoplait cup helix form, and Nyquil bottle radome, [see page 8 of the latest PSR] on the GPS helix antenna is amateur radio at its best.)
>
>73's
>Don, W4DH
>
>
>PS: The McGraw-Hill, Antenna Engineering Handbook, besides noting the problems above problems with patch antennas, mentions, "...It is important that the feed pin be securely soldered to the microstrip element since most failures of microstrip antennas occur at this point." I suspect this is true for the GPS-30 as well and could be a reason for the rough treatment during the cover removal putting making the antenna work.

8. Re: [TACGPS:1008] TAC32 Version 1.1.7 is available

From: Tom Clark <clark@tomcat.gsfc.nasa.gov>
Date: Tue, 20 Jan 1998 03:36:36 +0000
To: tacgps@tapr.org
Message-ID: <34C41BC4.FD5B0F15@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Rick -- a new glitch I just found -- don't know how long it's been there.
My previous testing had been with the laptop. I just copied everything
to the older W95 P133 downstairs. Unfortunately that box uses COM2
for the mouse and has no PS2 rodent support.

When I activate TAC32 with the GPS stuff on COM1, the mouse dies.
I've seen it before when software tests for the different COMx ports --
apparently the testing operation "eats" the rodent's interrupt. The only
way to restore it is with the old 3-fingered panic escape (Ctl-Alt-Del).

Back circa December this wasn't a problem.

73, Tom

9. Re: [TACGPS:1010] Re: TAC32 Version 1.1.7 is available

From: Alan Biddle <APBIDDLE@worldnet.att.net>
Date: Tue, 20 Jan 1998 13:31:40 +0000
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980120133140.007c7300@postoffice.worldnet.att.net>
Rendered body type: text/plain

I noticed a similar glitch in an earlier version. I still use a DOS comm
program for some things, and I noticed that when TAC32 started up, it blew
the DOS program off line. If TAC32 was running, no problem.

Alan
WA4SCA

10. RE: [TACGPS:1010] Re: TAC32 Version 1.1.7 is available

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Tue, 20 Jan 1998 12:16:06 -0500
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <01BD259D.2FE6F400@rick.cnssys.com>
Rendered body type: text/plain

Tom, Alan,

The problem of dynamically identifying all the serial ports on a computer without interfering with any
programs that may be using those ports has been a hot topic on the newsgroups for a long time. I
thought I had solved the problem but obviously not.

A fresh look at the problem has revealed an elegant (i.e., simple) solution. I have incorporated this
into V1.1.8. I will release this right away if you need it but I am working on some other fixes that I
am hoping to get into 1.1.8,

Rick

PS: I wonder how many interesting TACGPS messages I missed after the reflector crash. I only found out
about it last night and re-subscribed.

-----Original Message-----
From: Alan Biddle [SMTP:APBIDDLE@worldnet.att.net]
Sent: Tuesday, January 20, 1998 8:40 AM
To: tacgps@tapr.org
Subject: [TACGPS:1011] Re: TAC32 Version 1.1.7 is available

I noticed a similar glitch in an earlier version. I still use a DOS comm
program for some things, and I noticed that when TAC32 started up, it blew
the DOS program off line. If TAC32 was running, no problem.

Alan
WA4SCA

-----Original Message-----
From: Tom Clark [SMTP:clark@tomcat.gsfc.nasa.gov]
Sent: Monday, January 19, 1998 10:44 PM
To: tacgps@tapr.org
Subject: [TACGPS:1010] Re: TAC32 Version 1.1.7 is available

Rick -- a new glitch I just found -- don't know how long it's been there.
My previous testing had been with the laptop. I just copied everything
to the older W95 P133 downstairs. Unfortunately that box uses COM2
for the mouse and has no PS2 rodent support.

When I activate TAC32 with the GPS stuff on COM1, the mouse dies.
I've seen it before when software tests for the different COMx ports --
apparently the testing operation "eats" the rodent's interrupt. The only
way to restore it is with the old 3-fingered panic escape (Ctl-Alt-Del).

Back circa December this wasn't a problem.

73, Tom

11. WARNING - TAC-2 board error

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Tue, 20 Jan 1998 12:28:07 -0500
To: "'TacGps List'" <tacgps@tapr.org>
Message-ID: <01BD259E.DDC0C320@rick.cnssys.com>
Rendered body type: text/plain

All (especially Tom),

There is an error on the TAC-2 board!

If you use the Power Trends PT78ST105H or PT78ST153H you will find that the input and output pins are
reversed! This will put the input voltage directly on the output pins burning up all your active
components including the GPS receiver!

Fortunately I only loaded the passive components on the board before loading and testing the regulator.
  I only lost RFC1 and Z1.

Tom - can you devise a fix for this in case there is ever a Rev D board. Another suggestion for a Rev D
 - make the holes larger for components with fat leads like Z1. They fit fine when building the board
but rework is nearly impossible even with the right tools. This is worst on the ground holes where it
is hard to get enough heat and the lead is to tight so the solder doesn't let go.

Rick.

12. Re: [TACGPS:1013] WARNING - TAC-2 board error

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Tue, 20 Jan 1998 14:14:28 -0500
To: tacgps@tapr.org, Rick Hambly <rick@cnssys.com>
Message-ID: <34C4F794.70D3C22D@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Richard M. Hambly wrote:
>
> All (especially Tom),
>
> There is an error on the TAC-2 board!
>
> If you use the Power Trends PT78ST105H or PT78ST153H you will find
> that the input and output pins are reversed! This will put the input
> voltage directly on the output pins burning up all your active
> components including the GPS receiver!
>
> Fortunately I only loaded the passive components on the board before
> loading and testing the regulator. I only lost RFC1 and Z1.
>
> Tom - can you devise a fix for this in case there is ever a Rev D
> board. Another suggestion for a Rev D - make the holes larger for
> components with fat leads like Z1. They fit fine when building the
> board but rework is nearly impossible even with the right tools.
> This is worst on the ground holes where it is hard to get enough
> heat and the lead is to tight so the solder doesn't let go.

OUCH! This is a case of not testing all the options. I had tried the
PT5101 and it worked fine. I have a sample 78SR105 but never tried it.
I took it on faith that the vendor adhered to their "3-lead linear
regulator compatibility" statement -- but I find that this is not
quite the case. At the end of this message I have attached .GIF
clippings from http://www.powertrends.com/ for the pinouts on the
two different device types. You will note that Pin 1=in, Pin 2=gnd
and Pin 3=out for both the PT5101 and 78SR parts, but they swapped
pins 1&3 in the (recommended) horizontal mount configuration.

The pad layout is correct for the PT5100 switcher and the analog
7805 regulators, so it is not a good idea to change the PCB. The
"fix" is pretty simple & obvious (but it needs to be in the TAC-2
documentation!):

```
   +-------------------------------------------------+
   | FOR THE POWER TRENDS 78SR SWITCHING REGULATOR,  |
   | MOUNT IT ON THE BACK-SIDE OF THE CIRCUIT BOARD. |
   +-------------------------------------------------+
```

As of now there are no plans to do a Rev.D PCB.

73, Tom

Attachments follow, clipped from Power Trends .PDF format data
sheets are PT5101 and 78SR/ST series pinouts:
[Attachment: Pt5100.gif; image/gif; 7,846 bytes]
[Attachment: 78st100.gif; image/gif; 8,001 bytes]

13. No updates

From: relseth@siosolutns.win.net (Raymond A. Elseth)
Date: Tue, 20 Jan 1998 16:29:22
To: tacgps@tapr.org
Message-ID: <64@siosolutns.win.net>
Rendered body type: text/plain

I have received no postings from TACGPS since 5Jan. Is is possible
that my ID has dropped from the listserv?

       RAE

```
_____________________________________________________________
Raymond A. Elseth          Internet:  relseth@siosolutns.win.net
SIO Solutions              CIS UserID:  76137,2426
Palatine, IL               Voice:  847/705-9721
```

14. RE: [TACGPS:1015] No updates

```
From: "Richard M. Hambly" <rick@cnssys.com>
Date: Tue, 20 Jan 1998 18:04:00 -0500
To: "'Raymond A. Elseth'" <relseth@siosolutns.win.net>
Cc: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <01BD25CD.CBB4F780@rick.cnssys.com>
Rendered body type: text/plain
```

Yes. Here's a copy of the message that was sent to me yesterday.

Rick

---------- Forwarded message ----------
Date: Sun, 18 Jan 1998 00:01:18 -0600 (CST)
From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Reply-To: tapr-bb@tapr.org
To: tapr-bb@tapr.org
Subject: [TAPR-BB:393] TAPR TACGPS List

The TAPR TAC-2 and GPS list somehow decided to zap its subscribers list
several days ago. If you were on the TACGPS list, you'll need to subscribe
to the list again.

This can be done on our web page (http://www.tapr.org/tapr/html/sigs.html)
or send an e-mail to listserv@tapr.org and in the body of the message put
'subscribe tacgps'

Sorry for the bandwidth. We didn't have a better way to try to contact the
large group of people following the list that was lost.

If you know someone that was following the latest development on the TAC-2
and various GPS research, please tell them about this glitch.

Cheers - Greg

```
------------------------------------------------------------------------------
Tucson Amateur Packet Radio
8987-309 E Tanque Verde Rd #337 * Tucson, Az * 85749-9399
------------------------------------------------------------------------------
e-mail: tapr@tapr.org       web: <http://www.tapr.org/>
ftp:    ftp.tapr.org
phone:  940-383-0000        fax: 940-565-2544
------------------------------------------------------------------------------
```

-----Original Message-----
From: Raymond A. Elseth [SMTP:relseth@siosolutns.win.net]
Sent: Tuesday, January 20, 1998 5:40 PM
To: tacgps@tapr.org
Subject: [TACGPS:1015] No updates

I have received no postings from TACGPS since 5Jan. Is is possible
that my ID has dropped from the listserv?

       RAE

```
_____________________________________________________________
Raymond A. Elseth          Internet:  relseth@siosolutns.win.net
SIO Solutions              CIS UserID:  76137,2426
Palatine, IL               Voice:  847/705-9721
```

15. Ashtech G8 GPS Board?

```
From: "Rosenberg.Eric"<rosenberg.eric@orbcomm.com>
Date: Fri, 23 Jan 98 16:27:45 -0500
To: <tacgps@tapr.org>
Message-ID: <9801238855.AA885590992@occgate.orbcomm.com>
Rendered body type: text/plain
```

I've seen ads for the Ashtech G8 OEM board and was wondering what the
     GPS gurus (count yourselves in!) think about it. It uses the Phillips
     SC1575 GPS chip and has 1 PPS output. I found information on the

Ashtech web site (www.ashtech.com)

According to the spec sheet I have, the board is 1.5x2.3" and seems to
be cheap enough...they're quoting $ 98 for the board in quantities of
100, $139.99 in quantities of one. The evaluation and development kit
(board, power supply, antenna in a sensor box along with accompanying
software) is a whopping $1295.00

Eric W3DQ
Washington, DC

16. Re: [TACGPS:1017] Ashtech G8 GPS Board?

From: Lyle Johnson <lylej@azstarnet.com>
Date: Fri, 23 Jan 1998 18:00:32 -0700
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980123180032.00863420@pop.azstarnet.com>
Rendered body type: text/plain

At 03:35 PM 1/23/98 -0600, you wrote:
>
>   I've seen ads for the Ashtech G8 OEM board and was wondering what the
>   GPS gurus (count yourselves in!) think about it. It uses the Phillips
>   SC1575 GPS chip and has 1 PPS output. I found information on the
>   Ashtech web site (www.ashtech.com)
>
>   According to the spec sheet I have, the board is 1.5x2.3" and seems to
>   be cheap enough...they're quoting $ 98 for the board in quantities of
>   100, $139.99 in quantities of one. The evaluation and development kit
>   (board, power supply, antenna in a sensor box along with accompanying
>   software) is a whopping $1295.00

Eric,

I have the evaluation kit and can confirm the G8 certainly has no problem
finding GPS satellites. I have not had time to "wring it out" so I cannot
comment on accuracy, 1PPS deviation from "truth" etc.

Lyle

17. TAC32 Version 1.1.8 is available

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sat, 24 Jan 1998 21:40:57 -0500
To: "'TacGps List'" <tacgps@tapr.org>,
        "'DGPS List'"
 <dgps@tomcat.gsfc.nasa.gov>
Message-ID: <01BD2910.C464D540@rick.cnssys.com>
Rendered body type: text/plain

All TAC32 testers,

Version 1.1.8 of the TAC32 software is now available at http://www.cnssys.com/tac32/

Version 1.1.8, Jan 24, 1998: This is a primarily a bug fix release.

New Features

* Implemented choice of logging frequency to support long term PVT data collection studies. See New Log
 File and Open Log file Help for more information.

Bug Fixes:

* Changed the method used to locate installed serial ports to prevent lockup of a serial mouse and DOS
programs using a serial port.
* Improved the shutdown sequence to prevent a rare shutdown error.
* The receiver status on the Status Bar now correctly shown Motorola Binary mode.
* Changed the heartbeat monitor display to reduce CPU loading and make it more esthetically pleasing.
* File New, Open, Save and Close menu items are now correctly enabled and disabled for PVT logs.
* Made a number of internal changes to improve performance and reduce memory utilization.

18. Re: TAC32 Version 1.1.8 is available

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Sun, 25 Jan 1998 05:46:56 +0000
To: "Richard M. Hambly" <rick@cnssys.com>
Cc: "'TacGps List'" <tacgps@tapr.org>,
        "'DGPS List'" <dgps@tomcat.gsfc.nasa.gov>
Message-ID: <34CAD1D0.B2ADA9D@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Richard M. Hambly wrote:
>
> All TAC32 testers,
>
> Version 1.1.8 of the TAC32 software is now available at http://www.cnssys.com/tac32/
> [snip]
> Bug Fixes:
>
> * Changed the method used to locate installed serial ports to
> prevent lockup of a serial mouse and DOS programs using a serial
> port.

This seems to have fixed the "TAC32 eats Mouse" problem here -- Thanks.

I do note that the .exe file grew by 200+k from the previous release!

19. Pix of GPS Sat

From: "Charles E. Heisler K3VDB" <cheisler@cyberia.com>
Date: Sun, 25 Jan 1998 09:56:35 -0500
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19980125095635.006a1644@cyberia.com>
Rendered body type: text/plain

Hello All:.....I am looking for a good picture (.JPeg or what ever)
 of a GPS Satellite. I want to use it for a *short* Show and Tell at our
 local Ham club meeting.

        Thanks, Charlie

20. Re: [TACGPS:1021] Pix of GPS Sat

From: Dave Martindale <davem@cs.ubc.ca>
Date: Sun, 25 Jan 1998 09:35:49 -0800
To: tacgps@tapr.org
Message-ID: <l03130301b0f127f46383@[198.162.38.159]>
Rendered body type: text/plain

Here is a picture, sent as a MIME attachment. I hope your mail reader
can decode it OK. If not, let me know, and I can send it uuencoded
or something similar.

        Dave
[Attachment: GPSSAT.jpg; image/jpeg; 131,894 bytes]

21. Oops

From: Dave Martindale <davem@cs.ubc.ca>
Date: Sun, 25 Jan 1998 09:53:29 -0800
To: tacgps@tapr.org
Message-ID: <l03130300b0f12b1920ae@[198.162.38.159]>
Rendered body type: text/plain

Sorry about sending that satellite picture to the whole list. My intent
was to send it only to the person requesting it, but the reply automatically
goes to the list and I neglected to change it.

I hope someone else can make use of the picture, now that you have it.

        Dave

22. FW: SUBSCRIBE TACGPS JIM BITTLE

From: "Bittle, James F" <James.Bittle@MSRC.WPAFB.AF.MIL>
Date: Mon, 26 Jan 1998 07:12:39 -0500
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <ADCC38EE0118D011BFFB0000F801266302D416F8@asent45.wpafb.af.mil>
Rendered body type: text/plain

> SET TACGPS PASSWORD 885668678 alpha
>
>

23. Part Number ??

From: Reg Clemens <reg@dwf.com>
Date: Mon, 26 Jan 1998 11:14:44 -0700 (MST)
To: tacgps@tapr.org
Message-ID: <199801261814.LAA15519@clemens.dwf.com>
Rendered body type: text/plain

Could someone give me a pointer to a part number for the 10pin
socket on the end of the ribon cable that comes with the tac2

kit. Something I could find in the Digi-Key catalog would be
preferable.

Thanks.

                        Reg.Clemens
                        reg@dwf.com

24. Low cost GPS?

From: ss@posoe.com
Date: Tue, 27 Jan 1998 16:04:45 -0500
To: tacgps@tapr.org
Message-ID: <v03110700b0f3b09d8570@[38.244.114.92]>
Rendered body type: text/plain

Hello,

Im new to GPS and Packet, and have a Kantronics TNC-2 unit and am on 2 meters.

What im looking for now, are recommendations for what GPS unit to get so I
can use APRS (this TNC has a gps port on it).

The key here is price -- it needs to be cheap... I dont want to spend 200
bucks.   If I could get one for $100 or less, that would be great!

If you have any suggestions, I would greatly appriciate any sites to check out.

Thanks!

_Scott
N1VAN

25. TAC32 Oddities

From: gregory.beat@mediaone.net
Date: Wed, 28 Jan 1998 23:57:20 -0600
To: <tacgps@tapr.org>
Message-ID: <002401bd2c7a$c33b0820$c2928318@beatgr.ce.mediaone.net>
Rendered body type: text/plain

Rich,

Well I am back testing again. New PC [Zero Latency] more disk, RAM and a
Pentium II processor.

Passed up working Motorola PVT-6 receivers for $ 35 this past weekend at
Wheaton hamfest [still looking over my shoulder - though of Tom Clark's
original TAC-2 design]. The Motorola patch antennas where $ 10 (that I
should have bought). Maybe next month ....

Two oddities that I have noticed on the last release of TAC 32.

1.
When I start up TAC32 and the Oncore VP receiver is still acquiring sats,
the TAC32 clock defaults to UTC --- but uses the computer time as the
deafult UTC time. If I have the synchronization set for every minute ---
TAC32 appears to backsets my computer clock 6 hours (CST).

2.
When I modify the GPS Mode int he GPS Receiver Mode Slection screen, my
selection (0-D Nav Timing) is not saved (or toggled) --- unless I use the
Restore Default Radio Buttons [Nav and Timing] in the bottom left of the
screen.

You may have resolved this with the xx.18 release --- which I just
downloaded

Best wishes.

G. Beat
W9GB

26. What's in the ONCORE?

From: "Tom Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Thu, 29 Jan 1998 15:57:39 +0000
To: TACGPS <tacgps@tapr.org>
Cc: Phil Karn <karn@qualcomm.com>
Message-ID: <34D0A6F3.CC4D3F41@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

For those of you interested in how GPS rcvrs are made, and more
particularly want more details on the custom chips that are in
the Motorola ONCORE receivers: You might want to surf to the
Motorola ONCORE chipset web page at URL

   http://www.mot-sps.com/rf/applications/gps/gps.html

In particular, look at the MRFIC1502 details to see the RF front-
end portion, at the MCS3814 Digital Correlator to see the mult-
channel DSP IF stages, and at the GT/UT block diagram to see how
it is all glued together (this also applies to the VP ONCORE
which I believe differs from the GT/UT only in the amount of
ROM/RAM and in the firmware loaded into it).

73, Tom

27. GPS firmware problems?

From: Luca Bertagnolio <berta@micronet.it>
Date: Thu, 29 Jan 1998 19:31:14 +0100
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980129193114.012d7130@micronet.it>
Rendered body type: text/plain

Hi gang, this is a message I sent some weeks ago to the CANSPACE list, but
received no answer. Maybe the TACGPS list knows more about this.

73 de Luca

Hello,

I am curious to know what is happening on some GPS receivers since the
beginning of the new year; I have read the Jan 2nd General Message to GPS
users, and now the news are talking about severe GPS problems for the motor
rally Paris-Dakar. It seems like some pilot is upset after getting lost in
the Sahara desert...

What kind of behaviour do these GPS show? What models are affected? My
Motorola OnCORE VP works like a charm... :-)

Ciao from Milan, Italy

Luca Bertagnolio

28. DGPS support in the OnCORE

From: Luca Bertagnolio <berta@micronet.it>
Date: Thu, 29 Jan 1998 19:34:23 +0100
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980129193423.0092bdc0@micronet.it>
Rendered body type: text/plain

Hello list,

I seem to recall that someone here said that the OnCORE provides DGPS
signal (not RTCM-SC104 format) and this is well documented in the OnCORE docs.

Any link to browse for this information? I know Steve and the TAPR gang
are way ahead on the DGPS kit, but I am nonetheless interested.

73 de Luca

29. Re: [TACGPS:1030] DGPS support in the OnCORE

From: "Doug McKinney" <buoy@mcktech.com>
Date: Thu, 29 Jan 1998 11:03:07 -0800
To: <tacgps@tapr.org>
Message-ID: <199801291912.LAA19985@mail.redshift.com>
Rendered body type: text/plain

> From: Luca Bertagnolio <berta@micronet.it>
> To: tacgps@tapr.org
> Subject: [TACGPS:1030] DGPS support in the OnCORE
> Date: Thursday, January 29, 1998 10:39 AM
>
> Hello list,
>
> I seem to recall that someone here said that the OnCORE provides DGPS
> signal (not RTCM-SC104 format) and this is well documented in the OnCORE

docs.
>
> Any link to browse for this information? I know Steve and the TAPR gang
> are way ahead on the DGPS kit, but I am nonetheless interested.
>
> 73 de Luca

Hi Luca, I am Doug. Steve and I have been developing and have developed a
DGPS interface board for the Motorola VP ONCORE GPS engine.
It's in Beta testing and production units expected late FEB and they will
be sold though TAPR. See http://www.tapr.org/~n7hpr/dgps for additional
information.
73's
Doug KC3RL

30. Re: [TACGPS:1030] DGPS support in the ONCORE

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Thu, 29 Jan 1998 17:21:58 -0500
To: tacgps@tapr.org
Message-ID: <34D10106.7CBF023A@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Luca wrote:
> I seem to recall that someone here said that the OnCORE provides DGPS
> signal (not RTCM-SC104 format) and this is well documented in the OnCORE docs.
>
> Any link to browse for this information? I know Steve and the TAPR gang
> are way ahead on the DGPS kit, but I am nonetheless interested.
>
> 73 de Luca

Doug gave you most of the answers. A few additional items to note,
since I have had the only working amateur SC104 station (W3IWI-13)
for a couple of years, and been working with Steve to evaluate the
performance of the new DGPS widget:

(1) In zero-baseline tests (both the DGPS master base and the remote
   slave running from the same antenna), the ONCORE => SC104 DGPS
   is capable of producing sub-meter performance, depending on
   the update rate with two ONCOREs. With the ONCORE master feeding
   a Garmin GPSII+ slave, performance is at the couple of meter level,
   in part because the Garmin's output is quantized at the ~1.6 meter
   level. The zero-BL tests are particularly useful. All other
   errors cancel out. And if the corrections are working right, then
   the slave should reproduce exactly the fixed a priori coordinates
   you have loaded into the master. This performance is nearly as good
   as I have been able to achieve with a ~$25,000 Trimble 4000SSE
   running as the master.

(2) The new hardware requires that you have an 8-channel ONCORE VP
   receiver. The older 6-channel units don't work, the ONCORE GT/UT
   don't work, and the ONCORE must be the new style (i.e. not the older
   and larger PVT-6 with built-in switching power supply and "real
   RS232" outputs. The DGPS adaptor board is the same size as the
   ONCORE VP, and the total size of the hardware is ~2.5" x 3" x 1"
   in size. 12 volts & antenna in, DGPS out! PC required only for
   setup.

(3) I wish that the ONCORE had more than 8 channels. The only
   satellites you can use for proper DGPS corrections have to be
   visible at both the "master" and the "slave". When there are 10-11
   satellites visible, there are problems in coordinating the "How
   do the receivers allocate their limited resources?" problem.
   The DGPS base station really needs to be in a location with a
   good, unobstructed view so that it doesn't impose unnecessary
   limitations on performance.

(4) If you have an ONCORE and want to see what the corrections look
   like, fire up the Motorola-supplied controller software (TAPR
   sends V10.0 with ONCOREs it supplies). After you see it is working,
   do the following:
     - Set to fixed position mode by entering   "php" & coordinates
       and then enabling with "phe on"
     - Enable the corrections by typing "corout #" where # is the
       message rate in seconds [0-255].
    at this point, two ONCOREs can link in proprietary DGPS mode by
    hooking up the TXD output from the master into the slave's RXD,
    providing both are running in Motorola's proprietary binary mode.

To see what the PR (pseudo-range, meters) and PRR (pseudo-range rate, meters/sec), hit the [F7] key on the PC running Motorola's controller. It is these numbers that are converted into the SC104 format in Steve's widget.

With the Motorola controller, you can also log the corrections to disk in human-readible format by typing "record cor". This is the data I have used in the past to measure the modulation power spectrum of SA.

(5) The widget Steve & Doug have been developing has onboard a 12v => 5v power supply, RS232 interface and a PIC 16C73 microcontroller. Steve has written his code in PIC assembly language. The C73 has a lot of features that are unused but it seems to be needed since the only RAM on the PIC RISC chip is the registers, and Steve has to hold both the input (Mot Binary) message and the SC104 output message in RAM while it is being converted.

(6) Rick has already tweaked TAC32 so it can be used to set up the ONCORE as a DGPS master. In (4) above, the "php", "phe" and "corout #" instructions are set in the GPS parameter screen. Just select the TIMING DEFAULTS button, then set the parameters in the DGPS frame (Mot Binary mode only).

(7) As Doug said, see Steve's DGPS pages on the TAPR web site at URL http://www.tapr.org/~n7hpr/dgps/ for some more details. The web page includes a photo of Doug's hardware board.

(8) One annoyance that isn't solved yet with either my "high price" W3IWI-13 or the new hardware -- the Garmin interface. When the "raw" SC104 bits are poked into a Garmin (38,40,45,45XL,II+ and probably all the others), it responds fine. When those same bits are sent as <UI> frames on a TNC and the TNC is hooked directly to the Garmin "slave", they fail. When the DGPS signals go thru the DGPS path in the APRS software they work fine. Any of the TNC connections work fine with Motorola rcvrs (ONCOREs or the old TRAXAR+ handhelds).

It appears that the Garmin rcvrs "choke up" with the extra "packet racket" on the channel. We have some ideas on how to fix this but as of today, it is still a problem.

Luca -- be patient! The project is in the works, but it evolving by the day. 73, Tom

31. Re: [TACGPS:1032] Re: DGPS support in the ONCORE

From: Dave Martindale <davem@cs.ubc.ca>
Date: Thu, 29 Jan 1998 16:39:53 -0800
To: tacgps@tapr.org
Message-ID: <l03130300b0f6ce0637f7@[198.162.38.159]>
Rendered body type: text/plain

> With the ONCORE master feeding
> a Garmin GPSII+ slave, performance is at the couple of meter level,
> in part because the Garmin's output is quantized at the ~1.6 meter
> level.

Some possibly useful comments: If you record the NMEA output of a Garmin handheld receiver, the 0.001 arcminute resolution is indeed about 1.8 m. But if you set the receiver to UTM display and then just watch the display, you get 1 m resolution - you just can't record it.

The GPS-20 outputs one extra digit of lat/long in the NMEA data, so its precision is 0.18 m - much more interesting. However, the 20 is approximately the same receiver as the 45XL, and my 45 XL has much more residual error after DGPS correction than the 12XL - enough that the extra digit from the 20 is probably noise.

However, if the GPS-25 still outputs 0.0001 arcminute NMEA data, you may be able to see just how good (or bad!) the 12-channel Garmin receiver is. (The handheld 12XL still has only 3 decimal places in the NMEA output, so its NMEA is worse than UTM on-screen).

Dave

32. NEW 2000XL IS OUT

From: "Rosenberg.Eric"<rosenberg.eric@orbcomm.com>
Date: Fri, 30 Jan 98 13:23:31 -0500

To: <tacgps@tapr.org>
Message-ID: <9801308861.AA886184716@occgate.orbcomm.com>
Rendered body type: text/plain

Thought the readers of this list might be interested in a user's
review of the new Magellan 2000XL GPS receiver.

I have no affiliation with Magellan other than that I work for a
company also owned (in part) by Orbital Sciences.

Enjoy!

Eric W3DQ

_____ Forward Header _____

Subject: NEW 2000XL IS OUT
Author: Manne.Keith at Orbcomm
Date: 26-01-98 10:48 AM

First of all, thanks to everyone who gave me information on getting a GPS from Magellan - I did finally get one. Now for the bigger news: what I got was the new 2000XL (I think someone said due out in April?). So, following obligations, here is what I have, to date, found to be different between this and the 'older' 2000XL I borrowed upstairs. Features found are subject to what I actually use, so there may be more changes than this...

The new 2000XL adds:

1) Military Grid Reference System (MGRS) is now supported.

2) Data Ready - the new XL2000 has contacts for PC / NMEA data exchange. This makes the XL2000 the least expensive PC-compatible GPS I have seen by a long shot (the next one up is a $120 yellow unit (not sure who makes that one) with no screen (HAS to go to a PC).

3) DGPS ready - you can connect a Differential GPS receiver, should you want to.

4) Second Locational Screen - You can have it report your position in BOTH Lat/Long and UTM at the same time (or any other combination of your choosing).

5) Second Data Screen - Similar to the original 4-line data screen, you get a second one -- for each item, you can select any of the original data items, PLUS and of 3 new ones:

   TTG (was only available in micro print on the compass screen in the original XL2000),
   XTE : Cross track error (perpendicular difference from planned course to your location -- there's a mathematical term for this geometrical construction that I can't remember.
   ETA : Yes, Estimated Time of Arrival.

6) New 'bell' icon. Tells you when you are w/in 1/10 distance unit of your destination. No, it doesn't make any sound, like would be useful. :-)

7) New Message screen : up to 20 landmarks can have longer messages attached to them. Most likely a response to the 6-character naming alolowed -- so OSCHQD can be expanded to "Orbital Sciences Corporation Headquarters - Dulles." Of course, with the 4-button character entry, it takes more time to enter that message than to drive there...

8) Near Messages : as with the 'bell icon', this puts a message on the message screen saying you are near your destination.

9) Auto-Average Location : another countermeasure against SA. It averages your positional "wobble" if you aren't moving significantly. In other words, no more bouncing altitude and wandering location.

10) Direct Map Projection : If you enter in the scale of your map, you can then tell it "I want to go 1.25 inches NW on my map", and it will set the appropriate coordinates. Since my maps don't give Lat/Long very frequently, this is a cool feature.

11) Map Distance Tool : The reverse of above, this will tell you your

position in inches/cm on your map.

12) Triangulation of LMKs : another way to project (enter unknown) LMKs - you can give it bearing from two known locations, and it triangulates the coords of the third corner of the triangle.

13) MOB tracking - What the manual calls Man OverBoard tracking. As far as I can tell, this means a quick way of simultaneously saying "tag this location and start tracking how to get back here."

Now, what the new XL2000 loses from the original:

1) No free carrying case -- you only get the lanyard now. On the other hand, the above outweigh the value of the case, IMHO.

2) The manual is missing the tables of lat/long of cities all over the world. So, go photocopy the old manual's tables, and don't tell anyone. (This coming from a copyright lawyer's husband... Oy!).

On the other hand, in light of being Data Ready, those pages are replaced with samples of all the different NMEA formats. Maybe not so useful to someone who only wants to know what to set the unit to for another unit, but nifty if you're a programmer interested in making up a custom GPS application... :-)

Hope all this is useful... You all KNOW I only played with my GPS this weekend for all of your benefit!!! :-)

-KManne

MGRS explanation from Dave Morley:

MGRS is Military Grid Reference System...the Earth is divided longitudinally like slices of an orange, and each slice is then sectioned (I think it's up to 80 degrees N and S of the Equator) Each section then contains 24 grid squares, measuring 100 km x 100 km. Within the squares, a 10 digit number is assigned to each 1 square meter. Example: AA1234512345

33. RE: [TACGPS:1025] Part Number ??

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sat, 31 Jan 1998 09:58:36 -0500
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <01BD2E2E.CD4EAAA0@rick.cnssys.com>
Rendered body type: text/plain

Reg,

I wonder if you got your answer yet? I was just cleaning out the backlog of e-mails and I saw your message.

I use a higher quality 3M connector, part # MSC10A-ND with MKSR10-ND strain relief - see http://www.digikey.com/CC/019.PDF

AMP and CW Industries also have them but they cost twice as much as the 3M. See CSR10G-ND at http://www.digikey.com/CC/015.PDF and ASC10G-ND with ASSR10-ND at http://www.digikey.com/CC/011.PDF

I have no idea where TAPR is getting their sockets.

Rick
WB2TNL

-----Original Message-----
From: Reg Clemens [SMTP:reg@dwf.com]
Sent: Monday, January 26, 1998 1:21 PM
To: tacgps@tapr.org
Subject: [TACGPS:1025] Part Number ??

Could someone give me a pointer to a part number for the 10pin socket on the end of the ribon cable that comes with the tac2 kit. Something I could find in the Digi-Key catalog would be preferable.

Thanks.

Reg.Clemens
reg@dwf.com

34. RE: New TAC32

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sat, 31 Jan 1998 18:25:33 -0500
To: "'Alan Biddle'" <APBIDDLE@worldnet.att.net>,
"'TacGps List'"
 <tacgps@tapr.org>
Message-ID: <01BD2E75.A060ED40@rick.cnssys.com>
Rendered body type: text/plain

Alan,

You are quite correct! The bug you found applies only to Garmin receivers. I have fixed it in the new 1.1.9 release. I have also added a user selection in the Averaging Parameters window to enable or disable automatic resetting of averaging on restoration of lock after an unlock. This is needed by Garmin users because they go out of lock so often they can't get a good average position.

The interesting status messages you saw on the signal strength bars in the help screen are only available in Motorola Binary mode. Sorry, those status flags just aren't in the NMEA messages.

Version 1.1.9 will be out as soon as I correct the remaining bugs people have reported.

Thanks to all the Beta testers for your help in making TAC32 a useful tool.

Rick

-----Original Message-----
From: Alan Biddle [SMTP:APBIDDLE@worldnet.att.net]
Sent: Saturday, January 31, 1998 2:28 PM
To: Richard M. Hambly
Subject: RE: New TAC32

Rick,

OK. Just the facts.

General point. The average altitude is always 50% or so of what the current value is, even if the system is up and running for a day or more. Typical values

Current	255	369	422	161
Average	129	148	205	80

My elevation MSL here is about 244 meters, as determined by an aviation sectional, and a military GPS with full accuracy enabled. (Some benefits to being a retired USAF Lt Col!)

I have never seen the average value anywhere near the current value. The lat/lon values wander +/- as one would expect. If the current value begins to decrease, so does the average value. I would expect that if the current value is ~2 the average value, the average would continue to converge, i.e. increase.

Now take a period in which there is a good enought geometry for a 3-d fix. If it loses lock, i.e. turns red, even for one tick, the average elevation is set to zero, and then starts counting up again. It seems to stagnate around the 50% level.

If it switches to 2-d mode and back, I think the current value freezes, though I have been unable to observe that this afternoon to verify it.

Hope this has been some help.

BTW, you help file shows in the segnal strength bars some abreviations on what the status is for that satellite. Things like AS, SA, etc. I have never seen that. Does the G-20 support this?

Alan

35. Bug report -- TAC-2 1.1.8

From: gregory.beat@mediaone.net
Date: Sat, 31 Jan 1998 18:19:47 -0600
To: <tacgps@tapr.org>
Message-ID: <000601bd2ea7$1b640dc0$c2928318@beatgr.ce.mediaone.net>
Rendered body type: text/plain

Richard,

The screen redraws in the signal strength bar chart area do

not occur as other Win95 programs overlap the screen TAC-2
screen and then are closed or minimized. Minimizing the TAC-2
program and then restoring does not resolve the problem.

I have observed on two occasions that during long
periods of the program [with drops of 3-D lock] TAC-2 reverts
or drops to a Motorola 6 channel configuration from the
8 channel configuration for my Oncore VP.

I also have experienced an occasion lock up of TAC-2 program,
but until I can assess if this is an Intel P-II / Win95 problem
with my new computer .... I will just collect data on these events.

G. Beat
W9GB

..... the truth is out there .... somewhere ..

36. Re: [TACGPS:1036] RE: New TAC32

From: "Charles E. Heisler K3VDB" <cheisler@cyberia.com>
Date: Sat, 31 Jan 1998 20:57:17 -0500
To: tacgps@tapr.org
Message-ID: <3.0.2.16.19980131205717.2d9ff136@cyberia.com>
Rendered body type: text/plain

At 05:26 PM 1/31/98 -0600, you wrote:

>OK. Just the facts.
>
>General point. The average altitude is always 50% or so of what the
>current value is, even if the system is up and running for a day or more.
>Typical values
>
>Current   255   369   422   161
>
>Average   129   148   205   80
>
>My elevation MSL here is about 244 meters, as determined by an aviation
>sectional,

        Hi Rick:......Is it possible that the Garmin receivers
 suffer the same error as described by Alan? I am seeing a similar
 error in altitude average with my Garmin.

        -73- Charlie

February 1998

Original source file: tacgps.9802
Source: http://ftp.tapr.org/product_docs/TAC2/mail_archives/tacgps.9802

1. Updated TAC-2 Assembly Manual

```
From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Sun, 1 Feb 1998 16:25:01 -0600
To: " tacgps "<tacgps@tapr.org>
Message-ID: <v03130319b0faa613b133@[208.134.134.40]>
Rendered body type: text/plain
```

We have updated the assembly manual and it can be downloaded from

<ftp://ftp.tapr.org/tapr/tac2/tac2.manual.pdf>

or the web page http://www.tapr.org/tapr/html/tac2.html

If you haven't checked out the web page recently, please do. A number of
new things are on-line now like Tom's presentation from the DCC, Henk's
photos of his build, and some other things.

Greg

Greg Jones, WD5IVD
Austin, Texas
wd5ivd@tapr.org
http://www.tapr.org/~wd5ivd

Any sufficiently advanced technology is indistinguishable from
a rigged demo.

---

2. RE: [TACGPS:1037] Bug report -- TAC-2 1.1.8

```
From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sun, 1 Feb 1998 17:52:15 -0500
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <01BD2F3A.221BD560@rick.cnssys.com>
Rendered body type: text/plain
```

Greg,

I have taken a look at these problems in hopes of getting fixes into Version 1.1.9. Unfortunately, I
have tried and tried and I cannot duplicate any of them. That doesn't mean they are not real, just that
 I can't see them here.

I need to be sure you are running Version 1.1.8 although the message title says you are. Some of the
problems could be associated with a memory /resources leak I fixed in that release.

I need to know what mode you are running (Garmin, Mot Bin, Mot NMEA). Mot Bin is notorious for long
periods of no activity as it uses a very efficient event driven messaging system - it only talks when
there is something useful to say. This reduced the CPU loading for TAC32 nearly in half compared to the
 NMEA mode.

It is hard to imagine dropping from 8 to 6 channel. TAC32 doesn't ever touch that stuff unless you
reconfigure the receiver. Perhaps you could log about a minute's worth of raw data, close the log and
wait for the problem to occur. Then Open the same log, appending a minute's worth of new data and send
it to me.

Is there anything else you can tell me that would help pinpoint the problems?

Rick

-----Original Message-----
From: gregory.beat@mediaone.net [SMTP:gregory.beat@mediaone.net]
Sent: Saturday, January 31, 1998 7:22 PM
To: tacgps@tapr.org
Subject: [TACGPS:1037] Bug report -- TAC-2 1.1.8

Richard,

The screen redraws in the signal strength bar chart area do
not occur as other Win95 programs overlap the screen TAC-2
screen and then are closed or minimized. Minimizing the TAC-2
program and then restoring does not resolve the problem.

I have observed on two occasions that during long
periods of the program [with drops of 3-D lock] TAC-2 reverts

or drops to a Motorola 6 channel configuration from the
8 channel configuration for my Oncore VP.

I also have experienced an occasion lock up of TAC-2 program,
but until I can assess if this is an Intel P-II / Win95 problem
with my new computer .... I will just collect data on these events.

G. Beat
W9GB

... the truth is out there .... somewhere ..

3. RE: [TACGPS:1038] RE: New TAC32

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sun, 1 Feb 1998 17:56:39 -0500
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <01BD2F3A.BFE05280@rick.cnssys.com>
Rendered body type: text/plain

Charlie,

I'm not sure if you missed my answer to Alan. This was a real bug in TAC32 that occurs ONLY with Garmin
 receivers. It is fixed in the soon to be released 1.1.9.

Rick

-----Original Message-----
From: Charles E. Heisler K3VDB [SMTP:cheisler@cyberia.com]
Sent: Saturday, January 31, 1998 8:59 PM
To: tacgps@tapr.org
Subject: [TACGPS:1038] RE: New TAC32

At 05:26 PM 1/31/98 -0600, you wrote:

>OK. Just the facts.
>
>General point. The average altitude is always 50% or so of what the
>current value is, even if the system is up and running for a day or more.
>Typical values
>
>Current   255   369   422   161
>
>Average   129   148   205   80
>
>My elevation MSL here is about 244 meters, as determined by an aviation
>sectional,

        Hi Rick:......Is it possible that the Garmin receivers
 suffer the same error as described by Alan? I am seeing a similar
 error in altitude average with my Garmin.

        -73- Charlie

4. Re: [TACGPS:1040] RE: TAC-2 1.1.8

From: gregory.beat@mediaone.net
Date: Mon, 2 Feb 1998 20:02:26 -0600
To: <tacgps@tapr.org>
Message-ID: <001a01bd3047$c807af40$33928318@beatgr.ce.mediaone.net>
Rendered body type: text/plain

-----Original Message-----
From: Richard M. Hambly <rick@cnssys.com>
To: tacgps@tapr.org <tacgps@tapr.org>
Date: Sunday, February 01, 1998 5:22 PM
Subject: [TACGPS:1040] RE: Bug report -- TAC-2 1.1.8

Greg,

>I need to know what mode you are running (Garmin, Mot Bin, Mot NMEA).
Running Mot Bin mode.

>It is hard to imagine dropping from 8 to 6 channel.
I have attached a log file from the latest "boot" when TAC-2 reports 6
channel mode. I usually can restart TAC-2 and finally get it to "see" 8
channel in the status bar.

GB
[Attachment: Tac32Log.txt; text/plain; 17,516 bytes]

5. Re: [TACGPS:1041] RE: New TAC32

From: gregory.beat@mediaone.net
Date: Tue, 3 Feb 1998 18:41:27 -0600
To: <tacgps@tapr.org>
Message-ID: <005a01bd3105$a52c8e00$33928318@beatgr.ce.mediaone.net>
Rendered body type: text/plain

Here are two log files. First is start-up of TAC-2 and observed as 6
channel
Second appears to be normal start-up as 8 channel.

Always in Mot Bin mode.

G. Beat
W9GB
[Attachment: Tac32Log.txt; text/plain; 17,516 bytes]
[Attachment: Tac321Log.txt; text/plain; 9,567 bytes]

6. TAC32 Version 1.1.9 is available

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sun, 8 Feb 1998 11:09:36 -0500
To: "'TacGps List'" <tacgps@tapr.org>,
        "'DGPS List'"
 <dgps@tomcat.gsfc.nasa.gov>
Message-ID: <01BD3482.15CD2280@rick.cnssys.com>
Rendered body type: text/plain

All TAC32 testers,

Version 1.1.9 of the TAC32 software is now available at http://www.cnssys.com/tac32/

Version 1.1.9, Feb 8, 1998: This is a bug fix release.

Bug Fixes:

* Rereads the receiver ID message when the serial port is reset to allow hot switching of receivers
without shutting down TAC32.
* Altitude averaging is now correctly calculated for Garmin receivers.
* Added a user selection to the Averaging Parameters window to enable or disable reset of the averaging
process on recovery from an unlock condition. This Garmin users should disable this reset in order to
get good long term averaging results as they seem to loose lock quite often.
* Revised the way satellite status data is generated, sorted and displayed to improve responsiveness and
 show up to 12 satellites in Motorola Binary mode.
* Eliminated reporting of invalid DOP values on the satellite status display. This primarily effected
2-D and 0-D (timing) navigation modes.

7. RE: [TACGPS:1043] RE: New TAC32

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sun, 8 Feb 1998 11:22:04 -0500
To: "'gregory.beat@mediaone.net'" <gregory.beat@mediaone.net>
Cc: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <01BD3483.D32C5520@rick.cnssys.com>
Rendered body type: text/plain

Greg,

I found your data most interesting. First, your receiver was never in 6-channel mode. The TAC32 display
 could have led you to believe that it was, however.

Your coverage must be very poor. In the two cases you sent there were 11 and 12 satellites in view but
only 3 satellites tracked. In versions up to 1.1.8 TAC32 would only display satellite data on those
satellites that had been recently tracked. Version 1.1.9 now displays data on all satellites in view
allowing up to 12 satellites to be shown.

I hope the new version will solve your problem and give you more insight on what's going on at your
location. Try it and let me know.

Thanks again to you and the others who have continued to help me make TAC32 better by taking the time to
 report problems and suggest improvements.

Rick
WB2TNL

-----Original Message-----
From: gregory.beat@mediaone.net [SMTP:gregory.beat@mediaone.net]
Sent: Tuesday, February 03, 1998 7:50 PM
To: tacgps@tapr.org
Subject: [TACGPS:1043] RE: New TAC32

Here are two log files. First is start-up of TAC-2 and observed as 6
channel
Second appears to be normal start-up as 8 channel.

Always in Mot Bin mode.

G. Beat
W9GB

8. Re: [TACGPS:1045] RE: New TAC32

From: gregory.beat@mediaone.net
Date: Sun, 8 Feb 1998 11:30:40 -0600
To: <tacgps@tapr.org>
Message-ID: <002101bd34b7$477ee540$33928318@beatgr.ce.mediaone.net>
Rendered body type: text/plain

From: Richard M. Hambly <rick@cnssys.com>

>Greg,
>I found your data most interesting. First, your receiver was never in
6-channel >mode. The TAC32 display could have led you to believe that it
was, however.

>Your coverage must be very poor. In the two cases you sent there were 11
and >12 satellites in view but only 3 satellites tracked.

Rich, I appreciate the time you have spent working on TAC32, I know it is
appreciated by many TAC-2 users.

The data I sent you -- is typical of the challenges in an urban setting ---
although my antenna is about 30 feet up ..... it still does not clear a
building to the west and a church steeple to the northeast. The data you
received is usually my "worst case" and when TAC32 reported that I had a 6
channel, instead of an 8 channel unit. In the late afternnons and early
evenings at my location, I successfully tracking 6 to 8 sats of the 10 to 12
that are usually visible

>In versions up to 1.1.8 TAC32 would only display satellite data on those
satellites >that had been recently tracked. Version 1.1.9 now displays data
on all satellites >in view allowing up to 12 satellites to be shown.

>Try it and let me know.

I will try the new version for a couple of weeks and report back. I did
promise you a "challenging" beta test site.

G. Beat

9. GPS30 failing

From: Phil Reed <pcr@ic.net>
Date: Mon, 09 Feb 1998 18:16:52 -0500
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19980209181652.0325243c@ic.net>
Rendered body type: text/plain

For a while now, my GPS 30 purchased through TAPR has been
acting flaky, and I've finally figured out what's happening.

Right after I got it, I put it up on the roof and ran it pretty much
non-stop for about a month, and it seemed to be performing
perfectly well (feeding the SA Watch program). With the onset of
winter, I took it down and started setting up to use it in the car.
At no time have I mistreated the unit.

However, after a few days, it wouldn't work. I couldn't get a lock,
at least according to Street Atlas 5 and SA Watch. I substituted
my Garmin GPS12xl, which worked fine.

Finally, I put it back up on the roof last week, and started looking at
the raw data. It ran well for about 12 hours, then lost lock again.
I disconnected the power (running it from a large gel cell), let it set for
24 hours, then powered it up again and watched the data come
out. It got a lock in a few minutes, and ran for a little while, then
started losing lock. In the $GPGSV sentence, the C/No numbers would
sit around 38 for a while, then would go null on all satellites at once.

Once it went, it might come back for a few seconds, but eventally, it
goes away forever. And, during this time, the $PGRMT sentence,
while reporting that all the self tests passed, would show an internal
temperature of 22 (degrees C), with outdoor temperature around 3-4
degrees C and no direct sunshine on the unit. It had started out
around 8.

Does this sound like a faulty receiver? Any ideas on a fix? Or do I
have $99 of junk?

All ideas welcomed.

...phil (kb8uoy)

10. Bad parameter in TAC32 1.1.9

From: Alan Biddle <APBIDDLE@worldnet.att.net>
Date: Tue, 10 Feb 1998 00:09:04 +0000
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980210000904.007bc180@postoffice.worldnet.att.net>
Rendered body type: text/plain

Hi,

I got the new 1.1.9, which at first glance seem to have the GPS-20 working
fine on the altitude. However, I sometimes get an error box which pops up
and says, besides TAC32, "The parameter is incorrect." Clicking on the OK
box clears the message, and all continues. There seems to be no pattern to
the message. I have gotten it on startup, and while updating the system
clock from the set clock menu. Any way I can get some more useful debug info?

Alan

11. Re: [TACGPS:1047] GPS30 failing

From: jdegood@sarnoff.com (JOHN DEGOOD)
Date: Mon, 09 Feb 1998 19:40:44 -0500
To: tacgps@tapr.org
Message-ID: <34DFA20C.11BE50FF@sarnoff.com>
Rendered body type: text/plain

Phil Reed wrote:
> Once it went, it might come back for a few seconds, but eventally, it
> goes away forever. And, during this time, the $PGRMT sentence,
> while reporting that all the self tests passed, would show an internal
> temperature of 22 (degrees C), with outdoor temperature around 3-4
> degrees C and no direct sunshine on the unit. It had started out
> around 8.

Note that your outdoor temperature of 3-4 deg C is ~40 deg F. On the
TAPR GPS-30 web page <http://www.tapr.org/gps/gps30pc.html> they
describe what sounds exactly like your problem:

> GARMIN has stated that most of these units are in good working
> condition, but some of them may occasionally fail to acquire
> satellites at ambient temperatures near 40 degrees F. Usually,
> this problem can be fixed by resoldering the shields near the
> board edge connector more carefully. For the typical consumer
> who deals with GARMIN, this is a return issue; however, for
> amateur radio experimenters correcting this problem should not
> be to serious to handle.

Hope this helps! 73, John NU3E

12. Re: [TACGPS:1048] Bad parameter in TAC32 1.1.9

From: Gary Sanders <gsanders@gte.net>
Date: Mon, 09 Feb 1998 20:47:18 -0500
To: tacgps@tapr.org
Message-ID: <34DFB1A6.54805218@gte.net>
Rendered body type: text/plain

I also get the Incorrect parameter message occasionally on startup.

One other thing - is anyone else having problems running SaWatch 3.05
after installing TAC32 1.1.9?

SaWatch starts OK, but after starting the GPS, no data is displayed.

(Please don't take this as a pot shot at TAC32 - I'm just trying to
 determine if I have a SaWatch problem, or if anyone else but me

has seen this.)

Gary Sanders

Alan Biddle wrote:
>
> Hi,
>
> I got the new 1.1.9, which at first glance seem to have the GPS-20 working
> fine on the altitude. However, I sometimes get an error box which pops up
> and says, besides TAC32, "The parameter is incorrect." Clicking on the OK
> box clears the message, and all continues. There seems to be no pattern to
> the message. I have gotten it on startup, and while updating the system
> clock from the set clock menu. Any way I can get some more useful debug info?
>
> Alan

13. RE: [TACGPS:1048] Bad parameter in TAC32 1.1.9

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Mon, 9 Feb 1998 21:09:45 -0500
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <01BD359F.0D075B20@rick.cnssys.com>
Rendered body type: text/plain

Alan,

This is a new one on me. The only error condition which could possibly cause the condition you describe
 happens when TAC32's attempt to set your system clock fails. Unfortunately I only display the
operating system message under this condition and no diagnostic information. The one thing that also
happens in this case is that TAC32 disables any further attempt to set the clock until you open the
timing window and click OK or restart the program.

Are you running Windows 95 or Windows NT? If NT, have you followed the instructions in the Help file
(How do I ...)?

Has anyone else ever seen this condition?

Rick

-----Original Message-----
From: Alan Biddle [SMTP:APBIDDLE@worldnet.att.net]
Sent: Monday, February 09, 1998 7:16 PM
To: tacgps@tapr.org
Subject: [TACGPS:1048] Bad parameter in TAC32 1.1.9

Hi,

I got the new 1.1.9, which at first glance seem to have the GPS-20 working
fine on the altitude. However, I sometimes get an error box which pops up
and says, besides TAC32, "The parameter is incorrect." Clicking on the OK
box clears the message, and all continues. There seems to be no pattern to
the message. I have gotten it on startup, and while updating the system
clock from the set clock menu. Any way I can get some more useful debug info?

Alan

14. TAC32 1.1.9 / SAWatch Interaction

From: Gary Sanders <gsanders@gte.net>
Date: Tue, 10 Feb 1998 00:11:49 -0500
To: tacgps@tapr.org
Message-ID: <34DFE195.8A03BDF7@gte.net>
Rendered body type: text/plain

Per my earlier post - I've determined why SaWatch 3.08 won't
display properly after running (and closing) TAC32 1.1.9.

When TAC32 is run it disables the PGRME sentence, which is
apparently required for SAWatch to run in GPS-20 mode.

This apparently didn't happen in earlier versions of TAC32,
because there were no negative interactions between the two
programs that I was aware of.

Would it be possible to restore this sentence upon program
termination?

Gary Sanders
gsanders@gte.net

15. Re: [TACGPS:1051] RE: Bad parameter in TAC32 1.1.9

From: Alan Biddle <APBIDDLE@worldnet.att.net>
Date: Tue, 10 Feb 1998 12:32:31 +0000
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980210123231.007c4840@postoffice.worldnet.att.net>
Rendered body type: text/plain

Rick,

I am running WIN95. It is new to me since I loaded 1.1.9. I realize that isn't much to go on, and will see if I can find a pattern.

Alan

16. RE: [TACGPS:1052] TAC32 1.1.9 / SAWatch Interaction

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Tue, 10 Feb 1998 08:24:34 -0500
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <01BD35FD.521EF340@rick.cnssys.com>
Rendered body type: text/plain

Gary,

I'm a bit confused. TAC32 has always turned off all NMEA messages, then turns on only the ones it wants. PGRME isn't one of them. This is done because NMEA messages are so long and the data rate so slow that it can be difficult to get all the messages needed in a single second. The GPS III takes two seconds, in fact.

Because the documentation I have for the Garmin says nothing about a default configuration I do nothing on exit. I' m afraid that whatever I do on exit for one person could break something for someone else. I would have thought that SAWatch would handle its own initialization, insuring it received whatever information it needs. Is that not true?

Rick

-----Original Message-----
From: Gary Sanders [SMTP:gsanders@gte.net]
Sent: Tuesday, February 10, 1998 12:13 AM
To: tacgps@tapr.org
Subject: [TACGPS:1052] TAC32 1.1.9 / SAWatch Interaction

Per my earlier post - I've determined why SaWatch 3.08 won't display properly after running (and closing) TAC32 1.1.9.

When TAC32 is run it disables the PGRME sentence, which is apparently required for SAWatch to run in GPS-20 mode.

This apparently didn't happen in earlier versions of TAC32, because there were no negative interactions between the two programs that I was aware of.

Would it be possible to restore this sentence upon program termination?

Gary Sanders
gsanders@gte.net

17. That parameter is incorrect

From: Alan Biddle <APBIDDLE@worldnet.att.net>
Date: Sat, 14 Feb 1998 01:26:29 +0000
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980214012629.007b6bc0@postoffice.worldnet.att.net>
Rendered body type: text/plain

Hi,

After a week of watching, I have gotten the error message twice. I usually select PC-U for the time display. The first time, after the unit acquired enough birds to resolve the time, the display unblanked with a very large, red, negative number. i.e. something like -188789798. (not the actual number) After I cleared the error message, the display stayed the same for several minutes, and I eventually restarted TAC32, and all was well.

The second time, with UTC selected for display, it unblanked with a red 00:00:00.000. Actual time was 00:13 UTC. Again, no change until I restarted TAC32.

These two incidents occurred in something like 15-20 normal starts of TAC32.

Alan
WA4SCA

18. GPS25 with TAC2 - does it work?

From: "Ken Garlock" <k-garlock@ti.com>
Date: Mon, 16 Feb 1998 08:55:41 -0600
To: <tacgps@tapr.org>
Message-ID: <034b01bd3aea$f3682950$410819ac@c0153445.itg.ti.com>
Rendered body type: text/plain

I just bought a GPS25-lvs through TAPR as an increment improvement over my GPS20 on my TAC2 card. The pinouts match and it appeared to be a go. I installed it on my board Saturday and plugged it into my system running NT4 (SP3+). I am using TAC32 v1.1.9 as my clock software (It is a nice package - good work Rick!)

The specs on the GPS25 said it should lock in quickly, 12 minutes max, if I remember correctly, but less than a minute was typical. Well after 2 hours, it was still not locked. The number of visible Sats varied up to a max of 12. The number identified and displayed by TAC32 also varied from 7 to as low as 2 or 3; a restart of TAC32 seemed to get the units attention and it started identifying more Sats. but then, over time, the number started decreasing again. I never had the GPS25 unit lock on to a single Satellite. (BTW, I am using the Garmin GA26 external amplified antenna. Works fine with the GPS20 unit.)

So I have a couple questions for this erudite form:

1) Did I error by Assuming the GPS25 was a plug compatible replacement for the GPS20?
(If so, add one more to my list of *&%#$ errors- my fault, no problem, grumble, grumble.)

2) Is there something that the TAC32 needs to do to "set up" the GPS25 correctly?

3) Do I have a broken GPS25? **This is my guess at this point.**
If the opinion of this group is that the 25' is bad, has anyone had experience getting a unit
swapped out, or repaired? What is TAPR and/or Garmin's position?

I only subscribe to the TACGPS daily digest, but feel free to Email me directly,. Thanks for your
consideration of my problem.

73,
Ken Garlock k-garlock@ti.com
K8CHO This is my hobby, not my employer's. My comments, not theirs.
50Mhz WAS If Unix is so great, why didn't IBM invent it?

To assist you, three extracts of raw data from the TAC32 follow:

********** Short sequence from a working GPS20 system
****

```
; Opened TAC32 Raw Data Log Sun Feb 15 19:37:44 1998 UTC
-> $GPGSV,2,1,07,02,37,287,41,07,21,216,45,15,24,119,,18,24,187,35
-> $GPGSV,2,2,07,19,75,104,49,27,59,323,,31,42,045,46,,,,
?  $PGRME,70.1,M,135.3,M,152.3,M
?  $GPVTG,189.4,T,184.2,M,00.0,N,00.0,K
-> $GPRMC,193745,A,3301.4208,N,09644.4205,W,0.0,189.4,150298,005.3,E
-> $GPGGA,193745,3301.4208,N,09644.4205,W,1,05,1.5,253.2,M,-24.9,M,,
-> $GPGSA,A,3,02,07,,18,19,,31,,,,,,3.2,1.5,2.9
```

********** GPS 25 receiver id -- start up info as seen by TAC32
****

```
GPS 25LPXLVER  2.03
ROM checksum test (P=pass, F=fail) = P
Receiver failure? (P=pass, F=fail) = P
Stored Data (L=lost, R=retained) = R
Real time clock (L=lost, R=retained) = R
Oscillator drift (P=pass, F=fail) = P
Data collection (C = collecting) = 0
Board temperature (degrees C) = 38
.=.=.=.=
```

```
$PGRMO: Target Sentence = 0,   Mode = 2

$PGRMC Configuration Message:
  Fix Mode = A
  Altitude (MSL) = 289 meters
  Earth Datum Index = 100
  Semi-major axis = 0 meters
  Inverse Flattening factor = 0
  Delta-X = 0
  Delta-Y = 0
  Delta-Z = 0
  Differential Mode = A
  Baud Rate = 0
  Velocity Filter = 1
  Null field =
$PRGMI Initialization Message:
  Latitude = 33 deg  01.479 min N
  Longitude = 096 deg  44.424 min W
  Day = 14, Month = 02, Year = 98
  Hour = 21, Minute = 40, Second = 26
  Acq Reset = A
$PGRMO: Target Sentence = GPGGA,   Mode = 1
$PGRMO: Target Sentence = GPGSA,   Mode = 1
$PGRMO: Target Sentence = GPGSV,   Mode = 1
$PGRMO: Target Sentence = PGRMT,   Mode = 1

************************   extract of raw data stream from GPS25
**********************

; Opened TAC32 Raw Data Log Wed Dec 31 18:00:00 1969 UTC      <<<==  curious
????
-> $GPGGA,214410,3301.4790,N,09644.4240,W,0,00,,,M,,M,,
-> $GPGSA,A,1,,,,,,,,,,,,,,,
-> $GPGSV,3,1,12,03,00,064,,05,00,283,,06,00,220,,09,00,322,
-> $GPGSV,3,2,12,10,00,227,,14,00,108,,15,31,054,,16,00,132,
-> $GPGSV,3,3,12,17,00,307,,19,21,154,,26,15,288,,27,58,173,
-> $GPGGA,214411,3301.4790,N,09644.4240,W,0,00,,,M,,M,,
-> $GPGSA,A,1,,,,,,,,,,,,,,,
-> $GPGSV,3,1,12,03,00,064,,05,00,283,,06,00,220,,09,00,322,
-> $GPGSV,3,2,12,10,00,227,,14,00,108,,15,31,054,,16,00,132,
-> $GPGSV,3,3,12,17,00,307,,19,21,154,,26,15,288,,27,58,173,
-> $GPGGA,214412,3301.4790,N,09644.4240,W,0,00,,,M,,M,,
-> $GPGSA,A,1,,,,,,,,,,,,,,,
-> $GPGSV,3,1,12,03,00,064,,05,00,283,,06,00,220,,09,00,322,
-> $GPGSV,3,2,12,10,00,227,,14,00,108,,15,31,054,,16,00,132,
-> $GPGSV,3,3,12,17,00,307,,19,21,154,,26,15,288,,27,58,173,
-> $GPGGA,214413,3301.4790,N,09644.4240,W,0,00,,,M,,M,,
************   continues, for hours ******************
******* OEB, EOD, EOT  *******************************************
```

19. RE: [TACGPS:1056] GPS25 with TAC2 - does it work?

```
From: "Richard M. Hambly" <rick@cnssys.com>
Date: Mon, 16 Feb 1998 10:40:56 -0500
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Cc: "'k-garlock@ti.com'" <k-garlock@ti.com>
Message-ID: <01BD3AC7.5F55BFC0@rick.cnssys.com>
Rendered body type: text/plain
```

Ken,

TAC32 makes every effort to get your GPS receiver navigating quickly by sending your reference location and PC time (corrected to UTC) on initialization. Make sure they are correct.

Even so, I have seen a number of cases where factory fresh receivers take over night to begin working correctly. Don't forget that the receiver needs about 15 minutes to collect a valid ephemeris data set. This can be longer if the receiver is in the search the sky mode. Be patient.

Rick
WB2TNL

-----Original Message-----
From: Ken Garlock [SMTP:k-garlock@ti.com]
Sent: Monday, February 16, 1998 10:04 AM
To: tacgps@tapr.org
Subject: [TACGPS:1056] GPS25 with TAC2 - does it work?

I just bought a GPS25-lvs through TAPR as an increment improvement over my GPS20 on my TAC2 card. The pinouts match and it appeared to be a go. I installed it on my board Saturday and plugged it into my system running NT4

(SP3+). I am using TAC32 v1.1.9 as my clock software (It is a nice
package - good work Rick!)

 The specs on the GPS25 said it should lock in quickly, 12 minutes max, if
I remember correctly, but less than a minute was typical. Well after 2
hours, it was still not locked. The number of visible Sats varied up to a
max of 12. The number identified and displayed by TAC32 also varied from 7
to as low as 2 or 3; a restart of TAC32 seemed to get the units attention
and it started identifying more Sats. but then, over time, the number
started decreasing again. I never had the GPS25 unit lock on to a single
Satellite. (BTW, I am using the Garmin GA26 external amplified antenna.
Works fine with the GPS20 unit.)

  So I have a couple questions for this erudite form:

1) Did I error by Assuming the GPS25 was a plug compatible replacement for
the GPS20?
      (If so, add one more to my list of *&%#$ errors- my fault, no
problem, grumble, grumble.)

2) Is there something that the TAC32 needs to do to "set up" the GPS25
correctly?

3) Do I have a broken GPS25? **This is my guess at this point.**
      If the opinion of this group is that the 25' is bad, has anyone had
experience getting a unit
        swapped out, or repaired? What is TAPR and/or Garmin's position?

I only subscribe to the TACGPS daily digest, but feel free to Email me
directly,. Thanks for your
consideration of my problem.

73,
Ken Garlock   k-garlock@ti.com
K8CHO   This is my hobby, not my employer's. My
comments, not theirs.
50Mhz WAS   If Unix is so great, why didn't IBM invent it?

To assist you, three extracts of raw data from the TAC32 follow:

***************   Short sequence from a working GPS20 system
****

; Opened TAC32 Raw Data Log Sun Feb 15 19:37:44 1998 UTC
-> $GPGSV,2,1,07,02,37,287,41,07,21,216,45,15,24,119,,18,24,187,35
-> $GPGSV,2,2,07,19,75,104,49,27,59,323,,31,42,045,46,,,,
? $PGRME,70.1,M,135.3,M,152.3,M
? $GPVTG,189.4,T,184.2,M,00.0,N,00.0,K
-> $GPRMC,193745,A,3301.4208,N,09644.4205,W,0.0,189.4,150298,005.3,E
-> $GPGGA,193745,3301.4208,N,09644.4205,W,1,05,1.5,253.2,M,-24.9,M,,
-> $GPGSA,A,3,02,07,,18,19,,31,,,,,,3.2,1.5,2.9

********************** GPS 25 receiver id -- start up info as seen by TAC32
****

GPS 25LPXLVER 2.03
ROM checksum test (P=pass, F=fail) = P
Receiver failure? (P=pass, F=fail) = P
Stored Data (L=lost, R=retained) = R
Real time clock (L=lost, R=retained) = R
Oscillator drift (P=pass, F=fail) = P
Data collection (C = collecting) = 0
Board temperature (degrees C) = 38
.=.=.=.=
$PGRMO: Target Sentence = 0,   Mode = 2

$PGRMC Configuration Message:
  Fix Mode = A
  Altitude (MSL) = 289 meters
  Earth Datum Index = 100
  Semi-major axis = 0 meters
  Inverse Flattening factor = 0
  Delta-X = 0
  Delta-Y = 0
  Delta-Z = 0
  Differential Mode = A
  Baud Rate = 0
  Velocity Filter = 1

```
  Null field =
$PRGMI Initialization Message:
  Latitude = 33 deg  01.479 min N
  Longitude = 096 deg  44.424 min W
  Day = 14, Month = 02, Year = 98
  Hour = 21, Minute = 40, Second = 26
  Acq Reset = A
$PGRMO: Target Sentence = GPGGA,   Mode = 1
$PGRMO: Target Sentence = GPGSA,   Mode = 1
$PGRMO: Target Sentence = GPGSV,   Mode = 1
$PGRMO: Target Sentence = PGRMT,   Mode = 1

************************   extract of raw data stream from GPS25
**********************

; Opened TAC32 Raw Data Log Wed Dec 31 18:00:00 1969 UTC      <<<==  curious
????
-> $GPGGA,214410,3301.4790,N,09644.4240,W,0,00,,,M,,M,,
-> $GPGSA,A,1,,,,,,,,,,,,,,,
-> $GPGSV,3,1,12,03,00,064,,05,00,283,,06,00,220,,09,00,322,
-> $GPGSV,3,2,12,10,00,227,,14,00,108,,15,31,054,,16,00,132,
-> $GPGSV,3,3,12,17,00,307,,19,21,154,,26,15,288,,27,58,173,
-> $GPGGA,214411,3301.4790,N,09644.4240,W,0,00,,,M,,M,,
-> $GPGSA,A,1,,,,,,,,,,,,,,,
-> $GPGSV,3,1,12,03,00,064,,05,00,283,,06,00,220,,09,00,322,
-> $GPGSV,3,2,12,10,00,227,,14,00,108,,15,31,054,,16,00,132,
-> $GPGSV,3,3,12,17,00,307,,19,21,154,,26,15,288,,27,58,173,
-> $GPGGA,214412,3301.4790,N,09644.4240,W,0,00,,,M,,M,,
-> $GPGSA,A,1,,,,,,,,,,,,,,,
-> $GPGSV,3,1,12,03,00,064,,05,00,283,,06,00,220,,09,00,322,
-> $GPGSV,3,2,12,10,00,227,,14,00,108,,15,31,054,,16,00,132,
-> $GPGSV,3,3,12,17,00,307,,19,21,154,,26,15,288,,27,58,173,
-> $GPGGA,214413,3301.4790,N,09644.4240,W,0,00,,,M,,M,,
************   continues, for hours ******************
******* OEB, EOD, EOT  ********************************************
```

20. Re: [TACGPS:1056] GPS25 with TAC2 - does it work?

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Mon, 16 Feb 1998 18:47:05 +0000
To: tacgps@tapr.org, k-garlock@ti.com
Message-ID: <34E889A9.989F929A@clark.net>
Rendered body type: text/plain

Ken Garlock wrote:

```
>
> I just bought a GPS25-lvs through TAPR as an increment improvement over my
> GPS20 on my TAC2 card.  The pinouts match and it appeared to be a go.  I
> installed it on my board Saturday and plugged it into my system running NT4
> (SP3+).  I am using TAC32 v1.1.9 as my clock software (It is a nice
> package - good work Rick!)
>
>  The specs on the GPS25 said it should lock in quickly,  12 minutes max, if
> I remember correctly, but less than a minute was typical. Well after 2
> hours, it was still not locked.  The number of visible Sats varied up to a
> max of 12.  The number identified and displayed by TAC32 also varied from 7
> to as low as 2 or 3;  a restart of TAC32 seemed to get the units attention
> and it started identifying more Sats. but then, over time, the number
> started decreasing again.  I never had the GPS25 unit lock on to a single
> Satellite.  (BTW,  I am using the Garmin GA26 external amplified antenna.
> Works fine with the GPS20 unit.)
>
>   So I have a couple questions for this erudite form:
>
> 1)  Did I error by Assuming the GPS25 was a plug compatible replacement for
> the GPS20?
>       (If so, add one more to my list of *&%#$  errors- my fault, no
> problem, grumble, grumble.)

Regarding the GPS25 in the TAC-2 environment:

This configuration is totaly untested. I've never been able to get my
hands on one.

As I recall from the GPS-25's published specs, it has a much narrower
(10 usec) 1PPS signal. I've tried to enforce the hardware requirement that
the 1PPS signal be at least 0.1 seconds wide so that a software poll of the
RS232 DCD 1PPS signal would not get lost, and to make the hardware use of
the 1PPS signal easier. Both the Motorola ONCORE and the GPS-20 meet this
spec directly.
```

The CMOS 555 one-shot (U5) and the associated jumpers at JP4 were included as "in case you need them" options so that any receiver can meet the 100 msec wide 1PPS spec. The Trimble SK8 needs to use these options since it's 1PPS signal is also very narrow.

Until I can somehow get my hands on a GPS-25, I can't "certify" what is the proper TAC-2 hardware configuration [Greg -- a hint !!! ???]. However, I think that the material I have posted on Sheet 5 of the schematics for the Trimble SK-8 will work. I believe that TAPR did not distribute the final TAC-2 schematics with many of the TAC-2 kits. If you don't have sheet #5, you can fetch the complete schematic package from my FTP site at

   ftp://aleph.gsfc.nasa.gov/GPS/tac2/

On aleph, you will find the schematics in two formats -- PostScript in the file dwg2c-ps.zip and HP LaserJet in dwg2c-lj.zip.

Regarding the software setup, I can comment with certainty that my old MessDOS SHOWTIME software will fail with the narrow pulse, and I can state that I've made no provisions in SHOWTIME for GPS-25 initialization. I'll let Rick report on TAC32, but I know he has also not had his hands on a GPS-25 yet.

I do note this from your NMEA message dump:

> -> $GPGGA,214412,3301.4790,N,09644.4240,W,0,00,,,M,,M,,
Don't know where you are located, but the receiver thinks it is at Lat=33d 01m and Lon=96d 44m. This message also sez that the rcvr is not locked on any satellites. If these are incorrect coordinates, then the GPS-20 $PGRME initialization string didn't load any coordinates into the receiver.

> -> $GPGSA,A,1,,,,,,,,,,,,,,,
> -> $GPGSV,3,1,12,03,00,064,,05,00,283,,06,00,220,,09,00,322,
> -> $GPGSV,3,2,12,10,00,227,,14,00,108,,15,31,054,,16,00,132,
> -> $GPGSV,3,3,12,17,00,307,,19,21,154,,26,15,288,,27,58,173,
The string of ,,,,, in the GSA message again say that no satellites are in lock. In the GSV messages, strings like 03,00,064,, say that satellite PRN03 is at zero degrees elevation, and the ,, says the S/N for that satellite is zilch. Each one of the satellite strings (for all 12 channels) reports a zero S/N. Looks to me like it is in an all-sky search mode and hasn't found anything. Are you sure that you have an antenna connected?

73, Tom

21. RE: [TACGPS:1055] That parameter is incorrect

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Mon, 16 Feb 1998 17:50:50 -0500
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <01BD3B03.6C168DC0@rick.cnssys.com>
Rendered body type: text/plain

Alan,

Does this only happen at startup?

Rick

-----Original Message-----
From: Alan Biddle [SMTP:APBIDDLE@worldnet.att.net]
Sent: Friday, February 13, 1998 8:28 PM
To: tacgps@tapr.org
Subject: [TACGPS:1055] That parameter is incorrect

Hi,

After a week of watching, I have gotten the error message twice. I usually select PC-U for the time display. The first time, after the unit acquired enough birds to resolve the time, the display unblanked with a very large, red, negative number. i.e. something like -188789798. (not the actual number) After I cleared the error message, the display stayed the same for several minutes, and I eventually restarted TAC32, and all was well.

The second time, with UTC selected for display, it unblanked with a red 00:00:00.000. Actual time was 00:13 UTC. Again, no change until I restarted TAC32.

These two incidents occurred in something like 15-20 normal starts of TAC32.

Alan
WA4SCA

22. TAC-TOC

From: "Charles M. Coldwell" <coldwell@cfaiota0.harvard.edu>
Date: Mon, 16 Feb 1998 19:43:29 -0500 (EST)
To: tacgps@tapr.org
Message-ID: <m0y4b8D-005ICsC@cfaiota0.harvard.edu>
Rendered body type: text/plain

I've just joined the mailing list, and I'm curious to find out what the status of the TAC Oscillator Controller project is. I have a need for a stable 10 MHz, and I may be able to contribute something to this project if it looks likely that it could fill this need in the near future (say by the end of the summer). I have access to a well-equipped electronics lab and some small experience with circuit design, and I think I would really enjoying working on this project.

--

Charles M. Coldwell
Harvard-Smithsonian Center for Astrophysics
60 Garden St. MS #20
Cambridge, MA 02138
(617) 495-7491

23. Re: [TACGPS:1059] RE: That parameter is incorrect

From: Alan Biddle <APBIDDLE@worldnet.att.net>
Date: Tue, 17 Feb 1998 01:44:15 +0000
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980217014415.007c6950@postoffice.worldnet.att.net>
Rendered body type: text/plain

>Does this only happen at startup?

If you had asked yesterday, I would have said yes. However, I left things running all morning, and came back and found the same error message box. TAC32 was displaying UTC, in red, and the time shown was about 35 minutes earlier than the actual time. I cleared the error box, and it relocked in a minute or so.

Alan

24. Re: [TACGPS:1056] GPS25 with TAC2 - does it work?

From: "Ken Garlock" <k-garlock@ti.com>
Date: Tue, 17 Feb 1998 09:08:12 -0600
To: <tac@clark.net>
Cc: <tacgps@tapr.org>
Message-ID: <009c01bd3bb5$dd5e5c30$410819ac@c0153445.itg.ti.com>
Rendered body type: text/plain

Tom, thanks for your quick response to my questions yesterday.

Based upon your question regarding having an antenna connected, I reinstalled the GPS25 on the TAC2 board and checked to see that I was getting +5v on the mcx connector center pin, yes it was there. I ran the board for about 1.5 hrs, and I observed, via TAC32, that I never got a lock on any of the 11 satellites being reported from the unit. (Correction from yesterday, I am using the GA-28 marine antenna with a total of 45 feet of RG58. this antenna has worked without error on the GPS20.)
The manual says that you will not get any S/N numbers until the satellite is locked on. I did observe that the Azimuth numbers did vary over time. Also, the manual states that the unit should "aquire" in 15 sec "warm," and 5 minutes in "search the sky" mode. BTW, the lat/long values you saw are correct for my location, Plano Tx. (Dallas is a suburb of Plano.)

Next, I went back and did a "RTFM." I found two things:

1) Regarding the antenna: Garmin recommends not exceeding +15dB antenna + cable gain at the receiver input. The implication is that the GPS25 has good receiver in the unit. I quote: "Higher gain competitors antennas may be used provided there is adequate cable attenuation to prevent overloading the sensitive GPS 25LP receiver." A preceeding paragraph recommended using the GA27 antenna.
Next, I am going to add some additional RG58 to the ant. lead to see if I can get a signal level which will not swamp the receiver. I'll probably start with 10' and 20' hanks in series, observe, take out one hank, and

observe, etc. . .

2) Regardng the 1 PPS width: I found that the 1pps width is programable on the GPS25. The default is 100 msec (microsec I assume) The pps width can be specified in the $pgrmc sentence in
position 13 according to the formula (n+1)*20, where n is a value of 0 thru 48, thus giving a max pps length of 960 msec. This may obviate the the need for the 7555 Trimble mod???

So Tom, keeping in mind that this is a hobby, I will probably play with the antenna cable lengths this week or weekend. I would like to skin the satellite lock-on bear first. But, please feel free to make suggestions...

Regards,
Ken Garlock k-garlock@ti.com
K8CHO My opinions, not my employer's.

-----Original Message-----
From: Tom Clark (W3IWI) <tac@clark.net>
To: tacgps@tapr.org <tacgps@tapr.org>; k-garlock@ti.com <k-garlock@ti.com>
Date: Monday, February 16, 1998 12:47 PM
Subject: Re: [TACGPS:1056] GPS25 with TAC2 - does it work?

>Ken Garlock wrote:
>>
>> I just bought a GPS25-lvs through TAPR as an increment improvement over my
>> GPS20 on my TAC2 card. The pinouts match and it appeared to be a go. I
>> installed it on my board Saturday and plugged it into my system running NT4
>> (SP3+). I am using TAC32 v1.1.9 as my clock software (It is a nice
>> package - good work Rick!)
>>
>> The specs on the GPS25 said it should lock in quickly, 12 minutes max, if
>> I remember correctly, but less than a minute was typical. Well after 2
>> hours, it was still not locked. The number of visible Sats varied up to a
>> max of 12. The number identified and displayed by TAC32 also varied from 7
>> to as low as 2 or 3; a restart of TAC32 seemed to get the units attention
>> and it started identifying more Sats. but then, over time, the number
>> started decreasing again. I never had the GPS25 unit lock on to a single
>> Satellite. (BTW, I am using the Garmin GA26 external amplified antenna.
>> Works fine with the GPS20 unit.)
>>
>>   So I have a couple questions for this erudite form:
>>
>> 1) Did I error by Assuming the GPS25 was a plug compatible replacement for
>> the GPS20?
>>   (If so, add one more to my list of *&%#$ errors- my fault, no
>> problem, grumble, grumble.)
>
>Regarding the GPS25 in the TAC-2 environment:
>
>This configuration is totaly untested. I've never been able to get my
>hands on one.
>
>As I recall from the GPS-25's published specs, it has a much narrower
>(10 usec) 1PPS signal. I've tried to enforce the hardware requirement that
>the 1PPS signal be at least 0.1 seconds wide so that a software poll of the
>RS232 DCD 1PPS signal would not get lost, and to make the hardware use of
>the 1PPS signal easier. Both the Motorola ONCORE and the GPS-20 meet this
>spec directly.
>
>The CMOS 555 one-shot (U5) and the associated jumpers at JP4 were included
>as "in case you need them" options so that any receiver can meet the 100
>msec wide 1PPS spec. The Trimble SK8 needs to use these options since it's
>1PPS signal is also very narrow.
>
>Until I can somehow get my hands on a GPS-25, I can't "certify" what is the
>proper TAC-2 hardware configuration [Greg -- a hint !!! ???]. However, I
>think that the material I have posted on Sheet 5 of the schematics for
>the Trimble SK-8 will work. I believe that TAPR did not distribute the
>final TAC-2 schematics with many of the TAC-2 kits. If you don't have
>sheet #5, you can fetch the complete schematic package from my FTP site at

>
>   ftp://aleph.gsfc.nasa.gov/GPS/tac2/
>
>On aleph, you will find the schematics in two formats -- PostScript
>in the file dwg2c-ps.zip and HP LaserJet in dwg2c-lj.zip.
>
>Regarding the software setup, I can comment with certainty that my old
>MessDOS SHOWTIME software will fail with the narrow pulse, and I can state
>that I've made no provisions in SHOWTIME for GPS-25 initialization. I'll
>let Rick report on TAC32, but I know he has also not had his hands on
>a GPS-25 yet.
>
>I do note this from your NMEA message dump:
>
>> -> $GPGGA,214412,3301.4790,N,09644.4240,W,0,00,,,M,,M,,
>Don't know where you are located, but the receiver thinks it is at
>Lat=33d 01m and Lon=96d 44m. This message also sez that the rcvr is
>not locked on any satellites. If these are incorrect coordinates, then
>the GPS-20 $PGRME initialization string didn't load any coordinates into
>the receiver.
>
>> -> $GPGSA,A,1,,,,,,,,,,,,,,,
>> -> $GPGSV,3,1,12,03,00,064,,05,00,283,,06,00,220,,09,00,322,
>> -> $GPGSV,3,2,12,10,00,227,,14,00,108,,15,31,054,,16,00,132,
>> -> $GPGSV,3,3,12,17,00,307,,19,21,154,,26,15,288,,27,58,173,
>The string of ,,,,, in the GSA message again say that no satellites
>are in lock. In the GSV messages, strings like 03,00,064,, say that
>satellite PRN03 is at zero degrees elevation, and the ,, says the S/N
>for that satellite is zilch. Each one of the satellite strings (for all 12
>channels) reports a zero S/N. Looks to me like it is in an all-sky search
>mode and hasn't found anything. Are you sure that you have an antenna
>connected?
>
>73, Tom
>

25. Re: [TACGPS:1062] Re: GPS25 with TAC2 - does it work?

From: Gary Sanders <gsanders@gte.net>
Date: Tue, 17 Feb 1998 11:07:48 -0500
To: tacgps@tapr.org
Message-ID: <34E9B5D4.77BE1EB0@gte.net>
Rendered body type: text/plain

Ken,

Have you just let the unit run connected to the antenna for several
hours? (at least 4 or 5)

I have a couple of GPS20's that took several hours to "find
themselves" the first time they were fired up. If they are moved
for any substantial distance (a few hundred miles) unpowered the
sky search can take a _LOOOONG_ time. Much longer than the manual
claims, at least in the case of the two GPS20's I have.

I realize you probably have tried this, but I thought I'd mention
it anyway.

Gary Sanders
WB0BZR

26. Re: [TACGPS:1062] Re: GPS25 with TAC2 - does it work?

From: Dave Martindale <davem@cs.ubc.ca>
Date: Tue, 17 Feb 1998 09:21:44 -0800
To: tacgps@tapr.org
Message-ID: <l03130303b10f7512d9b4@[198.162.38.159]>
Rendered body type: text/plain

>1) Regarding the antenna: Garmin recommends not exceeding +15dB antenna +
>cable gain at the receiver input. The implication is that the GPS25 has
>good receiver in the unit. I quote: "Higher gain competitors antennas may
>be used provided there is adequate cable attenuation to prevent overloading
>the sensitive GPS 25LP receiver." A preceeding paragraph recommended using
>the GA27 antenna.
>Next, I am going to add some additional RG58 to the ant. lead to see if I
>can get a signal level which will not swamp the receiver. I'll probably
>start with 10' and 20' hanks in series, observe, take out one hank, and
>observe, etc. . .

I doubt if that will make any difference. I have a number of GPS antennas,

some with 10-15 dB more gain than the GA-27. They work well when there is
50 feet of extra RG-58 between the antenna and receiver (in addition to
the antenna's own 15 feet of RG-174). But they also work fine when connected
directly to the GPSes I've tried. (GPS-20, 45XL, 12XL).

Excess antenna preamp gain is a concern because it can create intermodulation
problems that aren't significant at lower signal amplitudes. (10 dB of
additional preamp gain increases the level of 2-frequency intermod by
20 dB and 3-signal intermod by 30 dB). But the Garmin receivers seem
to work fine with the additional signal level if intermod is not a problem.

One other suggestion: See if the satellites that the receiver says it is
searching for are actually in the right position for your location. This
can be checked against another GPS that is working, or there are apparently
places on the Internet that will show satellite coverage for a specific
place and time. If the unit has a bad almanac, local time, or lat/long
then it may be looking for the wrong satellites.

(Still, if the 25 is like the 20, it should eventually begin a "search the
sky" operation that finds its location no matter where it is in the world.

        Dave

27. Re: [TACGPS:1062] Re: GPS25 with TAC2 - does it work?

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Tue, 17 Feb 1998 15:53:30 -0500
To: tacgps@tapr.org, Ken Garlock <k-garlock@ti.com>
Message-ID: <34E9F8CA.EAECE016@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Ken Garlock wrote:
>
> Tom, thanks for your quick response to my questions yesterday.
>
>   Based upon your question regarding having an antenna connected, I
> reinstalled the GPS25 on the TAC2 board and checked to see that I was
> getting +5v on the mcx connector center pin, yes it was there. I ran the
> board for about 1.5 hrs, and I observed, via TAC32, that I never got a lock
> on any of the 11 satellites being reported from the unit. (Correction from
> yesterday, I am using the GA-28 marine antenna with a total of 45 feet of
> RG58. this antenna has worked without error on the GPS20.)
> The manual says that you will not get any S/N numbers until the satellite
> is locked on. I did observe that the Azimuth numbers did vary over time.
> Also, the manual states that the unit should "aquire" in 15 sec "warm," and
> 5 minutes in "search the sky" mode. BTW, the lat/long values you saw are
> correct for my location, Plano Tx. (Dallas is a suburb of Plano.)
>
>   Next, I went back and did a "RTFM." I found two things:
>
> 1) Regarding the antenna: Garmin recommends not exceeding +15dB antenna +
> cable gain at the receiver input. The implication is that the GPS25 has
> good receiver in the unit. I quote: "Higher gain competitors antennas may
> be used provided there is adequate cable attenuation to prevent overloading
> the sensitive GPS 25LP receiver." A preceeding paragraph recommended using
> the GA27 antenna.
> Next, I am going to add some additional RG58 to the ant. lead to see if I
> can get a signal level which will not swamp the receiver. I'll probably
> start with 10' and 20' hanks in series, observe, take out one hank, and
> observe, etc. . .

I find this statement hard to believe. In general, a GPS rcvr's performance
is set by S/N and not signal level. Preamp gain (up to some fairly ridiculous
input level like +50 dB preamp gain! at which point the rcvr's front-end
starts limiting) should not be an issue. The DSP in the rcvr is done after
the signal is hard-limited and, just like with an FM radio, once the signal
is "enough", more doesn't hurt (until you hit the burnout point or start
getting severe intermod). [Note -- I did NOT say that the rcvr is an FM rcvr --
in fact it is a BPSK rcvr working on pseudo-random noise signals. A one-bit
(hard limiting) A/D converter working on pseudo-random noise signals sill
suffer
a pi/2 = ~2 dB loss in SNR over a perfect, many-bit A/D converter. But the
1-bit
data stream is a lot easier to handle in a cheap DSP implementation.]

So the RTFM comments are, IMHO, an irrelevant red herring. Adding some loss
by using a longer piece of cable shouldn't help a thing (and may hurt if the
added loss approaches the antenna preamp's gain).

> 2) Regardng the 1 PPS width: I found that the 1pps width is programable on

> the GPS25. The default is 100 msec (microsec I assume) The pps width can
> be specified in the $pgrmc sentence in
> position 13 according to the formula (n+1)*20, where n is a value of 0 thru
> 48, thus giving a max pps length of 960 msec. This may obviate the the need
> for the 7555 Trimble mod???

I was just looking at the 25LP documentation (available on my aleph FTP site
at URL ftp://aleph.gsfc.nasa.gov/GPS/garmin/ as a PDF file) and it sez that the
25LP pulse width defaults to 100 milliseconds (page 11). That's good news.
In the GPS-25(no suffix)and GPS-25XL, I see that the pulse width is stipulated
as 1 usec (which is the factoid I had stuffed in the back of my brain) -- which
would require the use of the 555 one-shot just like in the Trimble SK-8.

I see the preamp gain quote you mentioned on Page 14. Like I said, it sounds
like BS to me! One other thing to check -- they state that they have some form
of current limiting on the +5VDC antenna bias, limiting it to 50 ma. Put a
voltmeter on the antenna connector on the rcvr PCB with tha antenna unplugged
--
it should be ~+5v. Then plug in the antenna, and see if the current drain is
such that the bias drops below ~+4.5v. It it does, then the rcvr's connector
simply can't handle the antenna preamp's current requirements.

I also see in the PDF files that the -25 has an additional parameter (compared
to the -20) in the $PGRMC message -- parameter <12> at the end =2 to turn on
the 1PPS output and =1 to turn it off, and that when 1PPS is turned on, it
becomes an 11 channel rcvr. Wonder what it does if it sees =0? Wierd!

73, Tom

28. RE: [TACGPS:1061] RE: That parameter is incorrect

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Tue, 17 Feb 1998 16:28:10 -0500
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <01BD3BC1.09FC52A0@rick.cnssys.com>
Rendered body type: text/plain

Alan,

I am trying to do something about this before releasing version 1.1.10, which is otherwise ready. If
only I can get this to happen here!

Rick

-----Original Message-----
From: Alan Biddle [SMTP:APBIDDLE@worldnet.att.net]
Sent: Monday, February 16, 1998 8:48 PM
To: tacgps@tapr.org
Subject: [TACGPS:1061] RE: That parameter is incorrect

>Does this only happen at startup?

If you had asked yesterday, I would have said yes. However, I left things
running all morning, and came back and found the same error message box.
TAC32 was displaying UTC, in red, and the time shown was about 35 minutes
earlier than the actual time. I cleared the error box, and it relocked in
a minute or so.

Alan

29. Re: [TACGPS:1065] Re: GPS25 with TAC2 - does it work?

From: Dave Martindale <davem@cs.ubc.ca>
Date: Tue, 17 Feb 1998 13:48:30 -0800
To: tacgps@tapr.org
Message-ID: <l03130301b10fb5ad931a@[198.162.38.159]>
Rendered body type: text/plain

>I also see in the PDF files that the -25 has an additional parameter (compared
>to the -20) in the $PGRMC message -- parameter <12> at the end =2 to turn on
>the 1PPS output and =1 to turn it off, and that when 1PPS is turned on, it
>becomes an 11 channel rcvr. Wonder what it does if it sees =0? Wierd!

Sounds like the 1PPS output is turned out, either it uses up 1/12 of the
DSP bandwidth, or it uses a pin somewhere that can be an output or input
but not both.

As a guess, if that parameter is zero it leaves the 1PPS state unchanged.

        Dave

30. RE: GPS25 - TAC2 progress

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Wed, 18 Feb 1998 10:45:27 -0500
To: "'TacGps List'" <tacgps@tapr.org>
Message-ID: <01BD3C5A.53C22EC0@rick.cnssys.com>
Rendered body type: text/plain

-----Original Message-----
From: Richard M. Hambly [SMTP:rick@cnssys.com]
Sent: Wednesday, February 18, 1998 10:23 AM
To: 'Ken Garlock'
Cc: tacgps@tpar.org
Subject: RE: GPS25 - TAC2 progress

Ken,

I will gladly add the pulse width parameter. I need to test to be sure this doesn't screw up other Garmins but I suspect it will work fine. I have a new release in the works and I will get this in there.

Rick

-----Original Message-----
From: Ken Garlock [SMTP:k-garlock@ti.com]
Sent: Wednesday, February 18, 1998 9:54 AM
To: "Dr Thomas A Clark (W3IWI)"; "Richard M. Hambly"
Cc: tacgps@tpar.org
Subject: GPS25 - TAC2 progress

Well Tom, like the newspaper man said, I dont make the news, I just report it. I accept and yield to your in-depth knowledge of the receiver operation. However, you did point me down a profitable avenue. I got out the Fluke 8050a DVM last night and checked the no-antenna voltage at the mcx connector on the GPS25, it read 5.104 volts. I then placed a coax Tee at the end of the mcx to BNC
pigtail, hooked on the antenna, and behold ZERO volts. Further checking found that I had a short in the antenna lead-in BNC connector where it connected to the pigtail. After correcting that, the GPS25 locked on to every sat that came within its window of consideration. The voltage then reported at the coax Tee was 4.952 volts. So, chock one up to a "KGFU" on the cabling, no one to blame but my sloppy connector installation. Multiple lashes with an old test lead! (grovel, deprecate, chagrin) I still dont understand why the GPS20 didnt have a signal strength problem when using the same antenna lead. A really strange intermittent short, Hummmmm.

The other issue remaining is the 1 PPS pulse width. The TAC32 software seems to be running just fine except, as predicted, it isn't seeing the 1 PPS signal. ** Rick Hambly: do you think it is worth a shot to add the pulse width parm to the TAC32 setup environment when you recognize the GPS25 unit? I'll let you and Dr.Tom ponder that issue.

Once again thanks for your patience and assistance.

Regards,
Ken Garlock k-garlock@ti.com
K8CHO My thoughts, not my employer

31. RE: TAC32 Version 1.1.9 is available

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Thu, 19 Feb 1998 22:00:11 -0500
To: "'TacGps List'" <tacgps@tapr.org>, "'DGPS List'" <dgps-list@cnssys.com>
Message-ID: <01BD3D81.C2A34F40@rick.cnssys.com>
Rendered body type: text/plain

All TAC32 testers,

Version 1.1.10 of the TAC32 software is now available at http://www.cnssys.com/tac32/

Version 1.1.10, Feb 19, 1998

* Default buttons on the Receiver Mode Screen no longer cause unexpected changes to the DGPS settings.
* An informative message is now displayed below the satellite data on the main screen when DGPS signals are being received. his works for both NMEA (Motorola or Garmin) mode with SC104 messages and Motorola Binary mode with proprietary Motorola DGPS messages.
* The satellite rise/set indicators now appear immediately for Motorola receivers (both NMEA and Binary modes).
* System time set and Out of lock indicator changes:
- Error reporting on system time set failure is enhanced to provide a more informative message.
- TAC32 is now prevented from making any attempt at setting the system clock when it detects an out of

lock condition.
- Improved the handling and reporting of out of lock warnings for unusual cases.
* Added support for the Garmin GPS-25LP receiver. See the "How to ..." Help topic for important information.
* Corrected the default main window size for first time users.

32. RE: TAC32 Version 1.1.10 is available

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Thu, 19 Feb 1998 22:00:54 -0500
To: "'Richard M. Hambly'" <rick@cnssys.com>,
        "'TacGps List'"
 <tacgps@tapr.org>,
        "'DGPS List'" <dgps-list@cnssys.com>
Message-ID: <01BD3D81.DADC7B40@rick.cnssys.com>
Rendered body type: text/plain

All TAC32 testers,

Version 1.1.10 of the TAC32 software is now available at http://www.cnssys.com/tac32/

Version 1.1.10, Feb 19, 1998

* Default buttons on the Receiver Mode Screen no longer cause unexpected changes to the DGPS settings.
* An informative message is now displayed below the satellite data on the main screen when DGPS signals are being received. his works for both NMEA (Motorola or Garmin) mode with SC104 messages and Motorola Binary mode with proprietary Motorola DGPS messages.
* The satellite rise/set indicators now appear immediately for Motorola receivers (both NMEA and Binary modes).
* System time set and Out of lock indicator changes:
- Error reporting on system time set failure is enhanced to provide a more informative message.
- TAC32 is now prevented from making any attempt at setting the system clock when it detects an out of lock condition.
- Improved the handling and reporting of out of lock warnings for unusual cases.
* Added support for the Garmin GPS-25LP receiver. See the "How to ..." Help topic for important information.
* Corrected the default main window size for first time users.

33. TAC32 comments

From: Dave Martindale <davem@cs.ubc.ca>
Date: Fri, 20 Feb 1998 14:42:12 -0800
To: "Richard M. Hambly" <rick@cnssys.com>
Cc: tacgps@tapr.org
Message-ID: <l03130300b113b217b8d5@[198.162.38.159]>
Rendered body type: text/plain

About a year ago, I obtained a used GPS-20, and built a "pseudo TAC" around it. I say "pseudo" because the TAPR kits were not available yet, so I did everything myself (borrowing liberally from Tom Clark's "TAC Lite" documents). Mine had a serial port and a 1 PPS coaxial output, but no 1PPS on DCD.

Recently, I added another board with a MAX232 to add the DCD output, and then I tried TAC32 for the first time. (It is 1.1.9). It installed (under Windows 95) and ran fine. After playing with it, I have a couple of comments about how it works:

If you select "Set PC Clock", you get a new window whose title is "Set PC Lock". That's probably just a typo.

If I select "Set PC Clock when error exceeds 100 msec", then quit Tac32, then start it up again, then turn on the TAC hardware, I can watch the GPS 20 acquire satellites. But at the point where the GPS 20 first locks and the 1 PPS LED starts flashing, I sometimes get an alert box saying "The parameter is incorrect". I don't get it all the time, and I don't seem to get it at all unless the "when error exceeds 100 msec" option is checked, or if I start things up in a different order.

I would guess it is some sort of error that occurs when trying to set the clock.

I also notice that the Eb/No numbers reported by Tac32 are 20 less than what is actually reported by the Garmin receiver. I understand that this is to make the Garmin look more like an Encore in the way it behaves. I don't have any Encore receivers, but I have several Garmins, and I have several other software packages that report the Garmin numbers verbatim, plus I do some of my own analysis of the Garmin output data. It is somewhat disconcerting to have Tac32 report different numbers than all of the other software.

I would suggest doing this, at least as an option: In the Eb/No column,
report the Garmin numbers as received, without subtracting 20. Continue to
subtract 20 when plotting the graphical signal bars, so they fit in the
space provided. But change the scale markings at the top to read from 20
to 60 instead of 0 to 40, so it fits the text numbers. That would make
the numbers reported by Tac32 match everything else I use.

I notice that the sound output choices are "none", "all", or "out of lock
only". I'd like to suggest adding a fourth choice: "normal ticks only".
As someone noted, the Garmin receiver drops below 4 satellites quite often,
so the "out of lock" bloop noises can be frequent. I'd like to be able
to turn them off, while retaining the normal tick sounds (plus the special
one at the top of each minute) which make it easy to set other timing
devices by ear.

I hope these suggestions are useful.

        Dave

34. RE: TAC32 comments

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Fri, 20 Feb 1998 20:38:32 -0500
To: "'Dave Martindale'" <davem@cs.ubc.ca>
Cc: "'TacGps List'" <tacgps@tapr.org>
Message-ID: <01BD3E3F.87F3B740@rick.cnssys.com>
Rendered body type: text/plain

Dave,

Thank you for your comments.

> If you select "Set PC Clock", you get a new window whose title is
> "Set PC Lock". That's probably just a typo.

This is fixed in the new version 1.1.11 I am working on.

> ... "The parameter is incorrect".
This has been reported by a number of users but I have yet to see it happen here. I took a stab at
fixing this in 1.1.10, which is available for download now. I have no feedback yet.

> Eb/No numbers reported by Tac32 are 20 less than
> what is actually reported by the Garmin receiver.

This is not to make the Garmin look like the Oncore but rather to make TAC32 look like Showtime. The
Garmin reports signal to noise (C/No) whereas TAC32 and Showtime report Eb/No. I used the same
conversion factor as Showtime, 20db, but I took another look at this and I now think that may be a
mistake. The correct conversion factor is 10log10(50Hz) which is approximately 17db. If I change this
conversion factor to 17db the Garmin and the Oncore will agree exactly, which at present they do not.
Unless Tom tells me I'm wrong I may change the conversion factor in 1.1.11. I will not, however, change
Eb/No back to C/No as I think Eb/No is a more correct measure for a digital data stream.

> ...I'd like to suggest adding a fourth choice: "normal ticks only".

I have already added this to 1.1.11. It should not be used by the serious user but I decided it was no
worse than the no sound selection.

Rick
WB2TNL

35. Re: [TACGPS:1072] RE: TAC32 comments

From: Dave Martindale <davem@cs.ubc.ca>
Date: Fri, 20 Feb 1998 18:09:30 -0800
To: tacgps@tapr.org
Message-ID: <l03130302b113e4e1bcb2@[198.162.38.159]>
Rendered body type: text/plain

>I have already added this to 1.1.11. It should not be used by the serious user but I decided it was no
 worse than the no sound selection.

This reminds me of another thing: While adding the DCD driver to my
pseudo-TAC, I looked at the specs of the MAX232 chip. It specifies a rise
time for its output of about 500 ns. I compared the DCD output of my
pseudo-TAC to the main 1 PPS output (driven by a 74HC04, 4 inverters
paralleled) and there was indeed about that much time difference between
the edges, judging from the very dim display on my scope.

This much delay is pretty insignificant when the MAX232 is being used for
serial data transmission, and still of little importance with a GPS-20
which has 1 us or more of jitter in its timing.

But for people using the Encore engine with its 50 ns accuracy, and
who carefully enter antenna and output cable delays in units of 1 ns,
an extra 500 ns is pretty large. (The delay would actually be half this
or less if the time is measured to the 0 V crossing point, rather than
the point at which the output reaches 10 V).

I think the "official" TAC may use a transistor circuit to drive the
DCD output instead of a MAX232, so I'd expect it to have a considerably
faster rise time. Still, the delay through whatever is used to drive
DCD might be of concern to some people. It's worth watching out for
if you're trying to get microsecond-level timing from the DCD output.

        Dave

36. Re: [TACGPS:1072] RE: TAC32 comments

From: "Charles E. Heisler K3VDB" <cheisler@cyberia.com>
Date: Fri, 20 Feb 1998 21:23:09 -0500
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19980220212309.0069ccf4@cyberia.com>
Rendered body type: text/plain

At 07:37 PM 2/20/98 -0600, you wrote:
>Dave,
>
>Thank you for your comments.
>
>
>> ... "The parameter is incorrect".
>This has been reported by a number of users but I have yet to see it
happen here. I took a stab at fixing this in 1.1.10, which is available for
download now. I have no feedback yet.
>
        Rick;...I have not seen it since 1.1.10. However, as I stated before I did
 not get it on a regular bases.

        -73- Charlie

37. RE: [TACGPS:1073] RE: TAC32 comments

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Fri, 20 Feb 1998 21:46:27 -0500
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <01BD3E49.006FBEE0@rick.cnssys.com>
Rendered body type: text/plain

Dave,

The DCD 1PPS signal is only used to synchronize the PC time. The PC clock is managed in 1ms resolution
for Windows NT and 95. However, the jitter is more like 20-50ms. Also, software delays in the serial
port drivers and the application software can be considerable compared to 500nsec. Anything
significantly better than 100ms accuracy is generally good enough for most users, including my military
customers. So you see, the MAX232's 500ns is not significant.

The coax delay and 1 nec resolution steering capability in the timing window is for tuning the buffered
1PPS signals on the BNCs, not the DCD.

Rick

-----Original Message-----
From: Dave Martindale [SMTP:davem@cs.ubc.ca]
Sent: Friday, February 20, 1998 9:10 PM
To: tacgps@tapr.org
Subject: [TACGPS:1073] RE: TAC32 comments

>I have already added this to 1.1.11. It should not be used by the serious user but I decided it was no
 worse than the no sound selection.

This reminds me of another thing: While adding the DCD driver to my
pseudo-TAC, I looked at the specs of the MAX232 chip. It specifies a rise
time for its output of about 500 ns. I compared the DCD output of my
pseudo-TAC to the main 1 PPS output (driven by a 74HC04, 4 inverters
paralleled) and there was indeed about that much time difference between
the edges, judging from the very dim display on my scope.

This much delay is pretty insignificant when the MAX232 is being used for
serial data transmission, and still of little importance with a GPS-20
which has 1 us or more of jitter in its timing.

But for people using the Oncore engine with its 50 ns accuracy, and

who carefully enter antenna and output cable delays in units of 1 ns,
an extra 500 ns is pretty large. (The delay would actually be half this
or less if the time is measured to the 0 V crossing point, rather than
the point at which the output reaches 10 V).

I think the "official" TAC may use a transistor circuit to drive the
DCD output instead of a MAX232, so I'd expect it to have a considerably
faster rise time. Still, the delay through whatever is used to drive
DCD might be of concern to some people. It's worth watching out for
if you're trying to get microsecond-level timing from the DCD output.

        Dave

38. Re: [TACGPS:1073] RE: TAC32 comments

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Sat, 21 Feb 1998 04:51:27 +0000
To: tacgps@tapr.org
Message-ID: <34EE5D4F.A3BD4DC6@clark.net>
Rendered body type: text/plain

Dave Martindale wrote:
[snip]
> This reminds me of another thing: While adding the DCD driver to my
> pseudo-TAC, I looked at the specs of the MAX232 chip. It specifies a rise
> time for its output of about 500 ns. I compared the DCD output of my
> pseudo-TAC to the main 1 PPS output (driven by a 74HC04, 4 inverters
> paralleled) and there was indeed about that much time difference between
> the edges, judging from the very dim display on my scope.
>
> This much delay is pretty insignificant when the MAX232 is being used for
> serial data transmission, and still of little importance with a GPS-20
> which has 1 us or more of jitter in its timing.

Rick's answer pretty well covered this, but I'll append my comments.
The DCD RS232 1PPS was never regarded as a "precision" timing mark.
The computer will either poll the DCD line or respond to its edge
as an interrupt, and the latency will be (at best) a few usec. Hence
I ignore its added delay as irrelevant. This is also the reason I want
to enforce the definition that the DCD 1PPS signal is WIIIIDDDDEEEE,
with the GPS-20 having a 100 msec wide pulse and the ONCORE a 200 msec
wide pulse. The MAX232-type chips work fine in data applications at 115
kb/s (9 usec/bit) and if you are lucky at 230 kb/s (5 usec/bit).

> But for people using the Encore engine with its 50 ns accuracy, and
> who carefully enter antenna and output cable delays in units of 1 ns,
> an extra 500 ns is pretty large. (The delay would actually be half this
> or less if the time is measured to the 0 V crossing point, rather than
> the point at which the output reaches 10 V).

The trigger point on the RS232 line is totally determined by the computer's
RS232 line receiver. MOST of themodern IC's used actually change state
at ~+2v level. This means that in most computers, a "TTL" 0/5V signal
will "tickle" an RS232 port just fine. In the simplest TAC-like
implementation, the 0/5V 1PPS signal drives the RS232 DCD pin "nude"
(I recommend a ~100 ohm series resistor), as can be seen in my "emulate"
documentation at
   ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.cloc/emulate.zip

> I think the "official" TAC may use a transistor circuit to drive the
> DCD output instead of a MAX232, so I'd expect it to have a considerably
> faster rise time. Still, the delay through whatever is used to drive
> DCD might be of concern to some people. It's worth watching out for
> if you're trying to get microsecond-level timing from the DCD output.

The "real" TAC-2 uses a MAX232 for its main RS232 interface. A PNP transistor
inverter/level converter is used in case one more RS232 TXD line is needed
(like for the Trimble SK-8); this "kinda cute" circuit "steals" some -10v
from the MAX232 and actually swings a slightly non-standard -10V to +5V.
Another RS232 "cheat" in the TAC-2 is that one of the dual-port RXD inputs
uses the MAX232, and the other one uses a 74HC132 CMOS Schmidt trigger with
"don't zap me" diode voltage clamps. If you want to see how I did these, the
"real" TAC-2 schematics are also on aleph (in either PostScript or HP
LaserJet formats) at URL

   ftp://aleph.gsfc.nasa.gov/GPS/tac2/

73, Tom

39. Re: [TACGPS:1071] TAC32 comments

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Sat, 21 Feb 1998 05:19:06 +0000
To: tacgps@tapr.org
Message-ID: <34EE63CA.76F8F02E@clark.net>
Rendered body type: text/plain

Dave Martindale wrote:
> [snip]
> I also notice that the Eb/No numbers reported by Tac32 are 20 less than
> what is actually reported by the Garmin receiver. I understand that this
> is to make the Garmin look more like an Encore in the way it behaves.
> I don't have any Encore receivers, but I have several Garmins, and I have
> several other software packages that report the Garmin numbers verbatim,
> plus I do some of my own analysis of the Garmin output data. It is somewhat
> disconcerting to have Tac32 report different numbers than all of the
> other software.

In the S/N field of the $GPGSV message the Garmin actually reports a parameter that is approximately C/No, not Eb/No, and the Garmin numbers are (approximately) 20 dB larger than the ONCORE values.

Let me digress with a bit of a tutorial. In the GPS signals, the fundamental spread-spectrum (SS) signal is generated with a 1023 bit long PRN sequence (unique for each satellite) clocked at a rate of 1.023 Mb/s; therefore it has a sequence length of 1.000 msec, and the "spreading gain" of 1023 or ~30 dB. This number is important because it sets a floor for the dynamic range between the strongest & weakest signals ~24 or 25 dB (slightly dependent on the details of the correlator and tracking loops in the receiver -- but I won't bore you with those details!). If you look at the S/N for satellites that are being tracked, you will NEVER see more than ~25 dB between the strongest & weakest ones.

The GPS signal structure then says that 20 of these 1 msec "bins" will be used to encode the 50 b/s data message; the basic message is 1500 bits long and takes 30 sec to repeat. Some more signal processing gain can be achieved by adding these bins coherently. If all 20 bins are used, and additional 13 dB of usable S/N can be achieved, but the dynamic range remains at ~25 dB.

It is in this step that the sequential Garmin receivers (GPS-38/40/45/45XL and the GPS-20/30) lose performance. One or two DSP receiver channels sequence around between the available satellites to make a fake many-channel receiver, at the loss of S/N performance.

It appears that the ONCORE receivers report their S/N as referred to the individual bits of the 50 b/s message -- The Eb means "energy per bit", and the noise bandwidth is ~50 Hz.

It further appears that the Garmin uses C/No, the "carrier" S/N, as referred to a 1 Hz post-detection bandwidth; hence it is numerically 17 dB bigger than the Eb/No. When I first looked at the Garmin (both GPS-20 & GPS-45) it appeared that the ONCORE-to-Garmin difference was actually more like 20 dB. In my older SHOWTIME software, I made the experimentally determined 20 dB correction to the Garmin (which meant that the bar-graph would still fit on the 80x25 character display screen!). When I handed over the SHOWTIME algo-rithms to Rick for TAC32, he followed my lead and subtracted 20 dB.

Actually, it is fortunate that both the ONCORE & Garmin report S/N in (approximate) dB -- as I read the NMEA spec for the $GPGSV message, the units are arbitrary. I believe that all the Trimble units report their amplitudes in "AMU" units (Arbitrary Measurement Units, although some of us have a less kind definition of the acronym!) which are NONE OF THE ABOVE.

> I would suggest doing this, at least as an option: In the Eb/No column,
> report the Garmin numbers as received, without subtracting 20. Continue to
> subtract 20 when plotting the graphical signal bars, so they fit in the
> space provided. But change the scale markings at the top to read from 20
> to 60 instead of 0 to 40, so it fits the text numbers. That would make
> the numbers reported by Tac32 match everything else I use.

But then he also needs to change the column caption to C/No! Personally, I prefer to have us keep the present convention.

73, Tom

40. That parameter is incorrect. NOT!

From: Alan Biddle <APBIDDLE@worldnet.att.net>
Date: Mon, 23 Feb 1998 01:01:52 +0000

To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980223010152.007b6670@postoffice.worldnet.att.net>
Rendered body type: text/plain

So far, all has been well with the new version. No nasty error messages
from WIN95 about parameters. Was the probable cause TAC32 trying to set
the system clock with a bad time?

Alan
WA4SCA

41. RE: [TACGPS:1078] That parameter is incorrect. NOT!

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Mon, 23 Feb 1998 07:29:04 -0500
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <01BD402C.B9221840@rick.cnssys.com>
Rendered body type: text/plain

Alan,

Yes, as the release notes state, the clock could have been set even during unlock conditions and some conditions that should have triggered an unlock condition didn't. I am hoping these changes will eliminate the problem.

Rick
WB2TNL

-----Original Message-----
From: Alan Biddle [SMTP:APBIDDLE@worldnet.att.net]
Sent: Sunday, February 22, 1998 8:08 PM
To: tacgps@tapr.org
Subject: [TACGPS:1078] That parameter is incorrect. NOT!

So far, all has been well with the new version. No nasty error messages
from WIN95 about parameters. Was the probable cause TAC32 trying to set
the system clock with a bad time?

Alan
WA4SCA

42. Re: GPS25 - TAC2 progress & Success!

From: "Ken Garlock" <k-garlock@ti.com>
Date: Mon, 23 Feb 1998 09:23:48 -0600
To: "Richard M. Hambly" <rick@cnssys.com>
Cc: <tacgps@tapr.org>
Message-ID: <002801bd406f$0a969470$410819ac@c0153445.itg.ti.com>
Rendered body type: text/plain

Hi Rick.

I installed your TAC32 1.1.10 version Friday night, and I am pleased to tell
you that it works just great!

I followed your directions in the help section, and the "little red light"
started pulsing just like it should.
Over several hours I got out of lock only once. I think you have a winner
with respect to the GPS25.

I am running NT4, SP3, plus most post SP3 patches. I leave the TAC2
attached to COM1 port all the time, and the power is derived from the PC
power supply. On a cold start (power on) the TAC32 has no problem opening
the TAC2 device and starting up normally. IF I shutdown NT4 and do a
hardware reset (do not power down the PC thus the TAC2 board keeps on
running) and then reboot NT4, nearly every time I get an error from TAC32
telling me that it had an error "opening the file" COM1 (when I look in the
raw data window.) I suspect that the TAC2 board is setting there sending
data down the RS232 line, and when NT opens the COM1 port it gets confused.
I was curious to know if you had ever seen anything like that? Is there a
way at TAC32 start up that you could "slap NT up along side the head" and
get the COM1 port open and talking? (I suspect Mr. Gates has "defined" the
com ports to be clear of data except when he says otherwise.)   I dont have
the exact message with me this morning, but if you like I can get it tonight
and Email it to you directly.

Regards,
Ken Garlock   k-garlock@ti.com
K8CHO   If Pro is for, and Con is against, is Congress
against Progress?

-----Original Message-----
From: Richard M. Hambly <rick@cnssys.com>
To: 'Ken Garlock' <k-garlock@ti.com>
Cc: tacgps@tpar.org <tacgps@tpar.org>
Date: Wednesday, February 18, 1998 9:19 AM
Subject: RE: GPS25 - TAC2 progress

>Ken,
>
>I will gladly add the pulse width parameter. I need to test to be sure
this doesn't screw up other Garmins but I suspect it will work fine. I have
a new release in the works and I will get this in there.
>
>Rick
>
     << SNIP >>

43. Re: GPS25 - TAC2 progress & Success!

From: Jim King <jim.king@mail.sstar.com>
Date: Mon, 23 Feb 1998 19:36:14 -0600
To: tacgps@tapr.org
Message-ID: <3.0.2.32.19980223193614.007040a0@mail.sstar.com>
Rendered body type: text/plain

Richard M. Hambly wrote:
>I am running NT4, SP3, plus most post SP3 patches. I leave the TAC2
>attached to COM1 port all the time, and the power is derived from the PC
>power supply. On a cold start (power on) the TAC32 has no problem opening
>the TAC2 device and starting up normally. IF I shutdown NT4 and do a
>hardware reset (do not power down the PC thus the TAC2 board keeps on
>running) and then reboot NT4, nearly every time I get an error from TAC32
>telling me that it had an error "opening the file" COM1 (when I look in the
>raw data window.) I suspect that the TAC2 board is setting there sending
>data down the RS232 line, and when NT opens the COM1 port it gets confused.
>I was curious to know if you had ever seen anything like that? Is there a
>way at TAC32 start up that you could "slap NT up along side the head" and
>get the COM1 port open and talking? (I suspect Mr. Gates has "defined" the
>com ports to be clear of data except when he says otherwise.)   I dont have
>the exact message with me this morning, but if you like I can get it tonight
>and Email it to you directly.

This is expected (and imho stupid) behavior on the part of the NT mouse
driver: If it sees *any* data coming down the serial line at boot time it
think there's a serial mouse on the port, and grabs the port, and that
prevents other applications from using the port.

Fortunately, you can tell NT to not look for serial mice on certain or all
ports. See the MS Knowledgebase article at
http://support.microsoft.com/support/kb/articles/q131/9/76.asp (If that
URL doesn't work, go to the Knowledgebase and search for "noserialmice".)

Jim

44. RE: [TACGPS:1081] Re: GPS25 - TAC2 progress & Success!

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Tue, 24 Feb 1998 09:56:07 -0500
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <01BD410A.6E246800@rick.cnssys.com>
Rendered body type: text/plain

Jim,

Thanks very much for this information! It didn't happen to me because I have the clock tied to COM12
and NT doesn't check that far for the mouse.

I have taken the information from the KB article and incorporated it into the Help file for version
1.1.11 (a work in progress).

I hope this solves Ken's problem.

Rick

-----Original Message-----
From: Jim King [SMTP:jim.king@mail.sstar.com]
Sent: Monday, February 23, 1998 9:00 PM
To: tacgps@tapr.org
Subject: [TACGPS:1081] Re: GPS25 - TAC2 progress & Success!

Richard M. Hambly wrote:
>I am running NT4, SP3, plus most post SP3 patches. I leave the TAC2
>attached to COM1 port all the time, and the power is derived from the PC
>power supply. On a cold start (power on) the TAC32 has no problem opening
>the TAC2 device and starting up normally. IF I shutdown NT4 and do a
>hardware reset (do not power down the PC thus the TAC2 board keeps on
>running) and then reboot NT4, nearly every time I get an error from TAC32
>telling me that it had an error "opening the file" COM1 (when I look in the
>raw data window.) I suspect that the TAC2 board is setting there sending
>data down the RS232 line, and when NT opens the COM1 port it gets confused.
>I was curious to know if you had ever seen anything like that? Is there a
>way at TAC32 start up that you could "slap NT up along side the head" and
>get the COM1 port open and talking? (I suspect Mr. Gates has "defined" the
>com ports to be clear of data except when he says otherwise.)   I dont have
>the exact message with me this morning, but if you like I can get it tonight
>and Email it to you directly.

This is expected (and imho stupid) behavior on the part of the NT mouse
driver: If it sees *any* data coming down the serial line at boot time it
think there's a serial mouse on the port, and grabs the port, and that
prevents other applications from using the port.

Fortunately, you can tell NT to not look for serial mice on certain or all
ports. See the MS Knowledgebase article at
http://support.microsoft.com/support/kb/articles/q131/9/76.asp (If that
URL doesn't work, go to the Knowledgebase and search for "noserialmice".)

Jim

45. [Offtopic] TAC-2 assembly question

From: David HM Spector <spector@zeitgeist.com>
Date: Wed, 25 Feb 1998 18:32:24 -0500
To: tacgps@tapr.org
Message-ID: <199802252332.SAA29163@wintermute.ny.zeitgeist.com>
Rendered body type: text/plain

Hi,

I hope I'm not too off base in dropping in a TAC-2 assembly question,
but its probably something silly I've missed and I'm sure someone here
has problably seen the same, or can offer a useful suggestion.

I just finished the primary construction of my new TAC-2, and have hit
a snag in the 2nd set of voltage tests.

All of the voltages check out to spec when tested WITHOUT ICs. (i.e.,
+5V at the various test-points on the IC sockets)

On the 2nd stage test, with the MAX232 (actually a DS232A was shipped)
I get +19.75V at the test pad between U2 and D5.

However, if I test between the - (GND) pad and pin 2 of U2, I get
almost the expected value +9.92 vs +10 that was expected

Ditto for the voltage at pin 6 of U2: -9.82 vs -10 that was expected

No solder bridges or cold joints are evident... did I miss something
big?

Any suggestions would be appreciated!

73,
 David

David HM Spector   spector@zeitgeist.com
Network Design & Infrastructure Security   voice: +1 212.579.8573
Amateur Radio: W2DHM (ARRL life member)   GridSquare: FN30as
-.-. --- -. -. . -.-. - .-- .. - .... .- -- .- - . ..- .-. .-. .- -.. .. ---
"New and stirring things are belittled because if they are not belittled,
the humiliating question arises, 'Why then are you not taking part in them?'"
                                                    --H. G. Wells

46. Re: [TACGPS:1083] [Offtopic] TAC-2 assembly question

From: "Steven R. Bible" <srbible@gate.net>
Date: Wed, 25 Feb 1998 19:14:20 -0500
To: tacgps@tapr.org
Cc: spector@zeitgeist.com

Message-ID: <3.0.1.32.19980225191420.007c7950@pop.gate.net>
Rendered body type: text/plain

At 05:36 PM 2/25/98 -0600, you wrote:
>Hi,
>
>I hope I'm not too off base in dropping in a TAC-2 assembly question,
>but its probably something silly I've missed and I'm sure someone here
>has problably seen the same, or can offer a useful suggestion.
>
>I just finished the primary construction of my new TAC-2, and have hit
>a snag in the 2nd set of voltage tests.
>
>All of the voltages check out to spec when tested WITHOUT ICs. (i.e.,
>+5V at the various test-points on the IC sockets)
>
>On the 2nd stage test, with the MAX232 (actually a DS232A was shipped)
>I get +19.75V at the test pad between U2 and D5.
>
>However, if I test between the - (GND) pad and pin 2 of U2, I get
>almost the expected value +9.92 vs +10 that was expected
>
>Ditto for the voltage at pin 6 of U2: -9.82 vs -10 that was expected

David, I think I know what you did.

I bet you placed the probes of your voltmeter on -10 and +10 pads. Looking
at the schematic, you'll measure close to 20 volts. If you measure the
individual pads to ground you should get the plus and minus 10 volts that
the assembly manual suggests. Give this a try. I think we'll need to make
a small change to the assembly manual.

 - Steve, N7HPR
 (n7hpr@tapr.org)

47. Re: [TACGPS:1084] Re: [Offtopic] TAC-2 assembly question

From: David HM Spector <spector@zeitgeist.com>
Date: Wed, 25 Feb 1998 19:43:44 -0500
To: tacgps@tapr.org, srbible@gate.net
Message-ID: <199802260043.TAA29657@wintermute.ny.zeitgeist.com>
Rendered body type: text/plain

>>>blush<<< ah-yup. that would be it!

Thanks Steve!

73, David
--

David HM Spector   spector@zeitgeist.com
Network Design & Infrastructure Security   voice: +1 212.579.8573
Amateur Radio: W2DHM (ARRL life member)   GridSquare: FN30as
-.-. --- -. -. . -.-. - .-- .. - .... .- -- .- - . ..- .-. .-. .- -.. .. ---
"New and stirring things are belittled because if they are not belittled,
the humiliating question arises, 'Why then are you not taking part in them?'"
                                                        --H. G. Wells

48. Com1 - TAC32 problem under NT4

From: "Ken Garlock" <k-garlock@ti.com>
Date: Fri, 27 Feb 1998 08:16:37 -0600
To: <jim.king@mail.sstar.com>
Cc: <tacgps@tapr.org>
Message-ID: <01ea01bd438a$51d36c00$410819ac@c0153445.itg.ti.com>
Rendered body type: text/plain

Jim, I tried your tip regarding the use of /NoSerialMice as a boot parm for
NT4.   It appears to have worked. I have rebooted several times after the
TAC2/GPS25 unit is up and talking, and TAC32 has not had any problems
opening the com1 port.

Thanks for your assistance.

73 &
Regards,
Ken Garlock   k-garlock@ti.com

K8CHO 50 Mhz WAS, Life Member: ARRL, QCWA
Original Call, 1956

49. TAC32 - Win 98 Beta 3 Testing

From: gregory.beat@mediaone.net
Date: Fri, 27 Feb 1998 23:06:45 -0600
To: <tacgps@tapr.org>
Message-ID: <000c01bd4406$ab8737a0$cd928318@beatgr.ce.mediaone.net>
Rendered body type: text/plain

Richard,

I have "upgraded" the current computer to MS Windows 98 Beta 3. [Windows 98 4.10.1650] So far, I have not observed unusual TAC32 activity.

WIll advise you, as approprate.

G. Beat
W9GB

50. RE: [TACGPS:1087] TAC32 - Win 98 Beta 3 Testing

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sat, 28 Feb 1998 07:28:43 -0500
To: <tacgps@tapr.org>
Message-ID: <199802281224.HAA26855@gw.cnssys.com>
Rendered body type: text/plain

Greg,

I am also running Win98 B3 on one machine here with no problems.

Rick

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of gregory.beat@mediaone.net
Sent: Saturday, February 28, 1998 12:12 AM
To: tacgps@tapr.org
Subject: [TACGPS:1087] TAC32 - Win 98 Beta 3 Testing

This is a multi-part message in MIME format.

------=_NextPart_000_0009_01BD43D4.5FF10280
Content-Type: text/plain;
charset="iso-8859-1"
Content-Transfer-Encoding: quoted-printable

Richard,

I have "upgraded" the current computer to MS Windows 98 Beta 3. =
[Windows 98 4.10.1650] So far, I have not observed unusual TAC32 =
activity.

WIll advise you, as approprate.

G. Beat
W9GB=20

------=_NextPart_000_0009_01BD43D4.5FF10280
Content-Type: text/html;
charset="iso-8859-1"
Content-Transfer-Encoding: quoted-printable

<!DOCTYPE HTML PUBLIC "-//W3C//DTD W3 HTML//EN">
<HTML>
<HEAD>

<META content=3Dtext/html;charset=3Diso-8859-1 =
http-equiv=3DContent-Type>
<META content=3D'"MSHTML 4.72.2106.6"' name=3DGENERATOR>
</HEAD>
<BODY bgColor=3D#ffffff>
<DIV><FONT color=3D#000000 face=3DArial size=3D2>Richard,</FONT></DIV>
<DIV><FONT color=3D#000000 face=3DArial size=3D2></FONT> </DIV>
<DIV><FONT color=3D#000000 face=3DArial size=3D2>I have =
"upgraded" the=20
current computer to MS Windows 98 Beta 3. [Windows 98=20
4.10.1650]   So far, I have not observed unusual TAC32=20

```
activity.</FONT></DIV>
<DIV><FONT color=3D#000000 face=3DArial size=3D2></FONT> </DIV>
<DIV><FONT color=3D#000000 face=3DArial size=3D2>WIll advise you, as=20
approprate.</FONT></DIV>
<DIV><FONT color=3D#000000 face=3DArial size=3D2></FONT> </DIV>
<DIV><FONT color=3D#000000 face=3DArial size=3D2>G. Beat</FONT></DIV>
<DIV><FONT color=3D#000000 face=3DArial size=3D2>W9GB =
</FONT></DIV></BODY></HTML>

------=_NextPart_000_0009_01BD43D4.5FF10280--
```

51. TAC32 - BSNBCPY.DLL ?

```
From: gregory.beat@mediaone.net
Date: Sat, 28 Feb 1998 07:44:37 -0600
To: <tacgps@tapr.org>
Message-ID: <000a01bd444f$041f30a0$cd928318@beatgr.ce.mediaone.net>
Rendered body type: text/plain
```

Rich,

I performed the latest TAC32 upgrade late last night, after I performed my Win98
upgrade. Hwen I started TAC32 this morning, I received the following message:

Error Starting Program
A required .DLL file, BSNBCPY.DLL
was not found

Thoughts?

G. Beat
W9GB

52. RE: [TACGPS:1089] TAC32 - BSNBCPY.DLL ?

```
From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sat, 28 Feb 1998 10:06:09 -0500
To: <tacgps@tapr.org>
Message-ID: <199802281501.KAA27536@gw.cnssys.com>
Rendered body type: text/plain
```

Greg,

You are correct. Version 1.1.11 doesn't work on Win98 (B3) That DLL is a mystery. Version 1.1.0 works fine as does 1.1.12, the version I am working on now. I may release 1.1.12 this weekend even though I won't have finished all the things I wanted to do with it.

Rick

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of gregory.beat@mediaone.net
Sent: Saturday, February 28, 1998 8:50 AM
To: tacgps@tapr.org
Subject: [TACGPS:1089] TAC32 - BSNBCPY.DLL ?

Rich,

I performed the latest TAC32 upgrade late last night, after I performed my Win98
upgrade. Hwen I started TAC32 this morning, I received the following message:

Error Starting Program
A required .DLL file, BSNBCPY.DLL
was not found

Thoughts?

G. Beat
W9GB

March 1998

Original source file: tacgps.9803
Source: http://ftp.tapr.org/product_docs/TAC2/mail_archives/tacgps.9803

1. Re: [TACGPS:1090] TACGPS digest 161

From: mpetz@ccm.stlcc.cc.mo.us (Micheal Petz)
Date: Tue, 3 Mar 1998 09:41:19 -0600
To: tacgps@tapr.org
Message-ID: <2.2.16.19980303094720.6017eece@ccm.stlcc.cc.mo.us>
Rendered body type: text/plain

Does anyone have the names (and phone numbers and/or URL's) for companies that make DGPS receivers and antennas. Also, please include the names and numbers for the outlet stores that would sell these units mail order.

I understand that TAPR is working on a system currently, but I will need the unit sooner that when they are ready to ship.

Thanks in advance
Michael Petz
KA9HNT
mpetz@ccm.stlcc.cc.mo.us

---

2. Re: [TACGPS:1091] Re: TACGPS digest 161

From: Kenneth Lerman <Kenneth.Lerman@lerman.nai.net>
Date: Tue, 3 Mar 1998 16:28:31 -0500 (EST)
To: tacgps@tapr.org
Message-ID: <199803032128.AA20799@lerman.nai.net>
Rendered body type: text/plain

> Does anyone have the names (and phone numbers and/or URL's) for
> companies that make DGPS receivers and antennas. Also, please include the
> names and numbers for the outlet stores that would sell these units mail
> order.
> I understand that TAPR is working on a system currently, but I will
> need the unit sooner that when they are ready to ship.

Is there any info available about what they will ship and when?

Thanks,

Ken

> Thanks in advance
> Michael Petz
> KA9HNT
> mpetz@ccm.stlcc.cc.mo.us
>

---

3. TAPR DGPS RefSta [was: TACGPS digest 161]

From: "Steven R. Bible" <srbible@gate.net>
Date: Tue, 03 Mar 1998 18:46:07 -0500
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19980303184607.007aa920@pop.gate.net>
Rendered body type: text/plain

At 03:26 PM 3/3/98 -0600, you wrote:
>> I understand that TAPR is working on a system currently, but I will
>> need the unit sooner that when they are ready to ship.
>
>Is there any info available about what they will ship and when?

In about a week I will make an announcement as to the availablity of the TAPR DGPS Reference Station (RefSta). Price has not determined yet.

The kit will allow you to set up a DGPS Reference Station and to transmit on packet radio the RTCM SC-104 DGPS corrections. Using a Motorola Oncore VP, the DGPS kit, GPS antenna, TNC, and transmitter, you can set up a reference station. The kit is a semi-kit in that the interface board is assembled and tested. You attach the power and data cables and you supply the power and enclosure.

The remote user using a receiver and TNC receives the corrections and feeds them to their DGPS ready receiver. Thus the remote user does not have to

buy any special equipment.

The frequency you choose to transmit on is up to you. A possible frequency
is the new APRS frequency of 145.39 MHz and to transmit the corrections
every 15 to 20 seconds. This is ample time for APRS packets and DGPS
corrections.

I would like to use the TACGPS list for further discussion of the DGPS
RefSta so fire your questions away!

 - Steve, N7HPR
 (n7hpr@tapr.org)

4. Re: [TACGPS:1093] TAPR DGPS RefSta [was: TACGPS digest 161]

From: "Steven R. Bible" <srbible@gate.net>
Date: Tue, 03 Mar 1998 20:09:46 -0500
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19980303200946.007f58b0@pop.gate.net>
Rendered body type: text/plain

At 05:50 PM 3/3/98 -0600, you wrote:
>The frequency you choose to transmit on is up to you. A possible frequency
>is the new APRS frequency of 145.39 MHz and to transmit the corrections
>every 15 to 20 seconds. This is ample time for APRS packets and DGPS
>corrections.

Opps! I've been corrected. It should be 144.39 MHz, not 145.39 MHz.

 - Steve, N7HPR
 (n7hpr@tapr.org)

5. TAC32 Version 1.1.11 is available

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Wed, 4 Mar 1998 12:48:26 -0500
To: <tacgps@tapr.org>, "'DGPS List'" <dgps@tomcat.gsfc.nasa.gov>
Message-ID: <199803041744.MAA18860@gw.cnssys.com>
Rendered body type: text/plain

All TAC32 testers,

Version 1.1.11 of the TAC32 software is now available at
http://www.cnssys.com/tac32/

Version 1.1.11, Mar 4, 1998

*   Performance Enhancement: Reduced memory and resource requirements,
improved execution speed and responsiveness. Added dynamic throttling
(internal flow control) and smart screen control. The results are
impressive! TAC32 now uses about half the CPU cycles with no loss in
functionality. When executed on a slow or overloaded computer, TAC32 is now
friendly and cooperative. I now have TAC32 running on a 486/66 with 8 Mb
RAM and Win95b. Performance on this machine is not stellar but it works.
*   Windows 98 (Beta 3): Version 1.1.10 didn't work on Windows 98 but this one
does.
*   Logging: TAC32 now remembers and uses the last directory accessed by File
New or Open between program sessions. This makes it easier for you to return
to a special directory where you keep logs.
*   Format: Redesigned the main screen to give it a cleaner look and to reduce
its width. This allows the screen to fit better on an 800x600 screen with
small fonts. It also allows a close but useful fit for 800x600 large font
and 600x480 small font screens. Corrected a spelling error in the title bar
of the "Set PC Clock" window.
*   Data: I changed the SNR to Eb/No scaling factor for Garmin receivers from
20db to 17db (10log10(50Hz)). It seems that the 20db used by ShowTime is
wrong. Now Garmin and Motorola receivers show nearly identical results when
connected to the same antenna at the same time.
*   Sound: Added a new choice, normal ticks only. This selection is for the
casual user, especially for Garmin users, who do not like or need the unlock
sound.

Thanks for hanging in there during these Beta tests.

Rick
WB2TBL

Richard M. Hambly
CNS Systems, Inc.
(410) 987-7835
http://www.cnssys.com/
[Attachment: winmail.dat; application/ms-tnef; 3,755 bytes]

6. TAC32 Version 1.1.11 is available

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Thu, 5 Mar 1998 09:09:15 -0500
To: <tacgps@tapr.org>, <dgps-list@cnssys.com>
Message-ID: <199803051404.JAA24130@gw.cnssys.com>
Rendered body type: text/plain

All TAC32 testers,

Version 1.1.11 of the TAC32 software is now available at
http://www.cnssys.com/tac32/

Version 1.1.11, Mar 4, 1998:

Performance Enhancement: Reduced memory and resource requirements, improved execution speed and responsiveness. Added dynamic throttling (internal flow control) and smart screen control. The results are impressive! TAC32 now uses about half the CPU cycles with no loss in functionality. When executed on a slow or overloaded computer, TAC32 is now friendly and cooperative. I now have TAC32 running on a 486/66 with 8 Mb RAM and Win95b. Performance on this machine is not stellar but it works.

Windows 98 (Beta 3): Version 1.1.10 didn't work on Windows 98 but this one does.
Logging: TAC32 now remembers and uses the last directory accessed by File New or Open between program sessions. This makes it easier for you to return to a special directory where you keep logs.

Format: Redesigned the main screen to give it a cleaner look and to reduce its width. This allows the screen to fit better on an 800x600 screen with small fonts. It also allows a close but useful fit for 800x600 large font and 600x480 small font screens. Corrected a spelling error in the title bar of the "Set PC Clock" window.

Data: I changed the SNR to Eb/No scaling factor for Garmin receivers from 20db to 17db (10log10(50Hz)). It seems that the 20db used by ShowTime is wrong. Now Garmin and Motorola receivers show nearly identical results when connected to the same antenna at the same time.

Sound: Added a new choice, normal ticks only. This selection is for the casual user, especially for Garmin users, who do not like or need the unlock sound.

Thanks for hanging in there during these Beta tests.

Rick
WB2TBL

Richard M. Hambly
CNS Systems, Inc.
(410) 987-7835
http://www.cnssys.com/

7. TAC32 sound

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Thu, 5 Mar 1998 10:43:09 -0500
To: "TAC-2 mail list" <tacgps@tapr.org>
Message-ID: <000301bd484d$72e47b60$3b1f5c18@john.tampabay.rr.com>
Rendered body type: text/plain

Rick -- I installed TAC32 1.1.11 for the first time today and it started right up with my Garmin GPS20 and seems to be running fine.
One question: Cannot seem to activate the sound function. I assume that I need a sound card (which I don't have in this PC) and that the PC speaker won't handle it. Once you confirm this I will rush right out and buy one.
The program looks great! Thanks for a good job.

John
W4SF

8. RE: [TACGPS:1097] TAC32 sound

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Thu, 5 Mar 1998 11:23:04 -0500
To: <tacgps@tapr.org>
Message-ID: <199803051618.LAA24716@gw.cnssys.com>
Rendered body type: text/plain

John,

I'm glad it worked for you. Have you tried any earlier versions? What is your machine (CPU, speed and memory)?

Yes, a sound card is required to use the sound functions. TAC32 plays WAV files which can't be done on the internal speaker. Nothing fancy is required. A basic no-name 16-bit sound card should work fine with a decent set of powered speakers. Watch out on the speakers. I sell PCs and I can tell you that a nice set of $20 speakers can sound better than some $99 models.

Rick
WB2TNL

Richard M. Hambly
CNS Systems, Inc.
(410) 987-7835
http://www.cnssys.com/

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of John K. Pringle
Sent: Thursday, March 05, 1998 10:46 AM
To: tacgps@tapr.org
Subject: [TACGPS:1097] TAC32 sound

Rick -- I installed TAC32 1.1.11 for the first time today and it started right up with my Garmin GPS20 and seems to be running fine.
One question: Cannot seem to activate the sound function. I assume that I need a sound card (which I don't have in this PC) and that the PC speaker won't handle it. Once you confirm this I will rush right out and buy one.
The program looks great! Thanks for a good job.

John
W4SF

9. Re: [TACGPS:1098] RE: TAC32 sound

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Thu, 5 Mar 1998 12:44:15 -0500
To: <tacgps@tapr.org>
Message-ID: <000801bd485e$7de7a260$3b1f5c18@john.tampabay.rr.com>
Rendered body type: text/plain

Rick -- Thanks for the info on sound cards and speakers. I will have both on the machine by tomorrow. This is the first version of TAC32 that I have tried. Been running SHOWTIME for about a year. The machine is a Pentium-133 with 64 MB of RAM running Windows 95 OSR2 with FAT32 partitions. Since TAC32 is installed on another machine that does not have internet access, had to use TAC32S.exe for installation. I assume that when you come out with the next version I will only have to replace the Tac32.cnt, Tac32.exe and Tac32.hlp files which I can easily get from the FTP site. After installation the program started in about 25 seconds after clicking on the shortcut, then it searched and found my Garmin GPS20 and immediately showed 8 birds in view and locked. The installation was trouble free. Wish all new programs installed as easily!

John
W4SF

-----Original Message-----
From: Richard M. Hambly <rick@cnssys.com>
To: tacgps@tapr.org <tacgps@tapr.org>
Date: Thursday, March 05, 1998 11:31 AM
Subject: [TACGPS:1098] RE: TAC32 sound

>John,
>
>I'm glad it worked for you. Have you tried any earlier versions? What is

>your machine (CPU, speed and memory)?
>
>Yes, a sound card is required to use the sound functions. TAC32 plays WAV
>files which can't be done on the internal speaker. Nothing fancy is
>required. A basic no-name 16-bit sound card should work fine with a decent
>set of powered speakers. Watch out on the speakers. I sell PCs and I can
>tell you that a nice set of $20 speakers can sound better than some $99
>models.
>
>Rick
>WB2TNL
>
>Richard M. Hambly
>CNS Systems, Inc.
>(410) 987-7835
>http://www.cnssys.com/
>
>
>-----Original Message-----
>From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of John K.
>Pringle
>Sent: Thursday, March 05, 1998 10:46 AM
>To: tacgps@tapr.org
>Subject: [TACGPS:1097] TAC32 sound
>
>
>Rick -- I installed TAC32 1.1.11 for the first time today and it started
>right up with my Garmin GPS20 and seems to be running fine.
>One question: Cannot seem to activate the sound function. I assume that I
>need a sound card (which I don't have in this PC) and that the PC speaker
>won't handle it. Once you confirm this I will rush right out and buy one.
>The program looks great! Thanks for a good job.
>
>John
>W4SF
>
>

10. Scholarship Info

From: Pat Kilroy <pat.kilroy@gsfc.nasa.gov>
Date: Fri, 06 Mar 1998 16:37:40 -0500
To: simsat@listserv.gsfc.nasa.gov
Message-ID: <3.0.5.32.19980306163740.007c0860@pop700.gsfc.nasa.gov>
Rendered body type: text/plain

Do you know either a young ham of note or an outstanding
student who is interested in a college scholarship?

Then check out:
http://garc.gsfc.nasa.gov/~simsat/sscholarship.html

Sincerely,

Pat WD8LAQ

11. Re: [TACGPS:1093] TAPR DGPS RefSta

From: "Milton D. Miller II" <miltonm@bga.com>
Date: Sat, 7 Mar 1998 00:07:48 -0600
To: tacgps@tapr.org
Message-ID: <199803070607.AAA01983@zoom.bga.com>
Rendered body type: text/plain

Question 1: can one run one of the TAC programs with the same reciever?

milton

12. Re: [TACGPS:1101] Re: TAPR DGPS RefSta

From: "Steven R. Bible" <srbible@gate.net>
Date: Sat, 07 Mar 1998 08:33:57 -0500
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19980307083357.00805c50@pop.gate.net>
Rendered body type: text/plain

At 12:09 AM 3/7/98 -0600, you wrote:
>Question 1: can one run one of the TAC programs with the same reciever?

Yes. TAC32 will display time in addition to doing the set up for the

Reference Station.

- Steve, N7HPR
(n7hpr@tapr.org)

13. Re: [TACGPS:1101] Re: TAPR DGPS RefSta

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Sat, 07 Mar 1998 17:53:35 +0000
To: tacgps@tapr.org
Message-ID: <3501899F.26CA500F@clark.net>
Rendered body type: text/plain

Milton D. Miller II wrote:

> Question 1: can one run one of the TAC programs with the same > reciever?

Steve gave you the brief "yes" answer. Let me expand on it a bit.

With the ONCORE, my recommendation for "best" timing results is that
you run the receiver in the "zero-D" position constrained mode with
the receiver "locked" to a best estimate of your location. When this
is done, the ONCORE uses the observed pseudo-ranges to all N available
satellites to calibrate the receiver's clock. The DoD-imposed
"clock jitter" (Selective Availability = SA) is incoherent between
the different satellites, so its effect on timing is reduced as
sqrt(N).

To generate DGPS signals, the receiver is constrained to a fixed
"zero-D" position. The received pseudo-ranges are corrected for
clock biases and the per satellite residual pseudo-range errors
(and their rates) relative to the assumed position are transmitted
as the DGPS correction data.

These are essentially identical tasks. The corrected receiver
clock is used for timing, and the range residuals constitute the
DGPS information. Hence timing and DGPS data generation are totally
compatible.

In Steve's DGPS adaptor board, he brings the 1PPS signal to the
computer's RS232 DCD pin (at raw 0/+5v "TTL" levels, which is
adequate to "tickle" most computer's serial ports). TAC32 has already been
configured (see the [Data] [Receiver Configuration] screen)
to handle all the DGPS setup parameters. TAC32 is a LOT easier to
use for these purposes than the controller software that Motorola
provides. I've been using TAC32 here for all my "beta" testing.

Note that the DGPS board is not a full "TAC" in that it lacks the
low-Z 1PPS drivers and it lacks a "real RS232" converter on the
DCD 1PPS line, but it does look like a TAC to the computer.
[If some of you have the need for a lab-quality TAC (with all its
pulse drivers, TOC expandability, etc) that also generates DGPS data
(like Steve's new DGPS widget), please let us know so that we can
consider way to merge the two activities.]

73, Tom

already been updated
position are

14. Amateur AVL use of DGPS (Was Re: TAPR DGPS RefSta)

From: Jeff King <jeff@mich.com>
Date: Sat, 07 Mar 1998 13:30:55 -0500
To: tacgps@tapr.org
Cc: aprssig@tapr.org
Message-ID: <3.0.5.32.19980307133055.035c0100@mail.mich.com>
Rendered body type: text/plain

This message is more directed to the amateur AVL camp but its
origins are a result of Steve Bibles DGPS correction system.

In the use of amateur AVL ("APRS"(tm) and others) there needs
to be a way to identify stations that are using DGPS corrections
as opposed to stations that are not. While, to my knowledge, none
of the present crop of amateur AVL programs are using "inverted DGPS"

(offsetting maps and/or icons to correct for SA using DGPS, also sometimes known as post correction) it needs
to be accounted for as I know some are working on a system like this.

In essence, all that would be required would be to transmit a special symbol indicating the fix was DGPS corrected. Then, any special mapping software would not need to offset this symbol if local DGPS was available.

Possibly these thoughts are already being discussed, but not seeing them on any of the open groups, I thought I would mention it.

-Jeff wb8wka

Regards,


```
-------------------------------------
| Jeff King      Aero Data Systems |
| jeff@mich.com  P.O. Box 510895   |
| (248)471-1787  Livonia, MI 48151 |
|F(248)471-0279  United States     |
-------------------------------------
```


15. Re: [TACGPS:1104] Amateur AVL use of DGPS

From: Bob Bruninga <bruninga@nadn.navy.mil>
Date: Sat, 7 Mar 1998 14:08:48 -0500 (EST)
To: tacgps@tapr.org
Cc: aprssig@tapr.org
Message-ID: <Pine.SOL.3.96.980307135030.15240H-100000@arctic>
Rendered body type: text/plain

On Sat, 7 Mar 1998, Jeff King wrote:

> In the use of amateur AVL ("APRS"(tm) and others) there needs
> to be a way to identify stations that are using DGPS corrections...

APRSdos REPLY/COMMENT: This is being phased into all versions of APRS. It is already in APRSdos and the others too I think. We are not rushing to announce it until all the bugs are worked out. The standard APRS formats are to hundredths of a minute resolution (60 feet). We have agreed on a new format that adds an additional Byte to get us down to 8 feet. If the added byte is present, then DGPS precision is available, otherwise it is "space" character implyin that DGPS precision is not available...

You will argue, why not more precision bytes. Answer is that the new format cuts the LAT/LONG from 19 bytes down to 9. Shorter position reports was the PRIMARY objective of this new format, but we did compromise with the one added byte to get reasonable DGPS resolution too.

It is important to me that APRS position reports do NOT contain precision where such precision is NOT available. For this reason APRSdos and the other authors have agreed to add ambiguity circles if you zoom in below the precision of the posit.

In APRSdos, for example, if you use a SPACE character for the hundredths digit, it will not display below the 8 mile map scale. (This is used for grid square reports that are only good to a mile or so).. If you make the decimal point and both hundredths digits be spaces, then it will not be visible below the 128 mile scale. (This is for people reporting only 4 digit gridsquares or DXcalls only known by prefix area). Etc...

I am against putting in posits of.00 if precision below a minute are not known. Because the receiver has no way of knowing the difference between an exact .00 and a .00 unknown. Therefore put SPACES where precision is not known...

 Reply mail addr:
wb4apr@amsat.org
US mail address: 115 old Farm Ct, Glen Burnie, MD 21060

See DAYTON97 HISTORY: http://web.usna.navy.mil/~bruninga/dayton.html
See Maryland APRS LIVE: http://web.usna.navy.mil/~bruninga/aprs.html
See GPS on ANY radio: http://www.tapr.org/tapr/html/mic-e.html

16. Re: [TACGPS:1105] Re: Amateur AVL use of DGPS

From: Jeff King <jeff@mich.com>
Date: Sat, 07 Mar 1998 18:29:25 -0500
To: tacgps@tapr.org
Cc: aprssig@tapr.org

Message-ID: <3.0.5.32.19980307182925.03686d30@mail.mich.com>
Rendered body type: text/plain

At 01:13 PM 3/7/98 -0600, Bob Bruninga wrote:
>On Sat, 7 Mar 1998, Jeff King wrote:
>
>> In the use of amateur AVL ("APRS"(tm) and others) there needs
>> to be a way to identify stations that are using DGPS corrections...
>
>APRSdos REPLY/COMMENT: This is being phased into all versions of APRS.
..
>feet. If the added byte is present, then DGPS precision is available,
>otherwise it is "space" character implyin that DGPS precision is not
>available...

This is perfect.

Thanks!

Jeff

17. xntp -> gps-20 + tac2

From: "Dag Bakke" <dagb@oslo.sgi.com>
Date: Tue, 10 Mar 1998 09:06:13 +0100
To: tacgps@tapr.org
Message-ID: <9803100906.ZM26682@dagb.oslo.sgi.com>
Rendered body type: text/plain

Hi all.

I have a few questions regarding the subject, and I couldn't find a mailing
list archive nor a FAQ at ftp://ftp.tapr.org/tapr/SIG/.

If my qestions are answered in a faq or archive, *please* point me to it. It is
not my intention to demonstrate bad netiquette by asking previously answered
questions.....

1.
Can I connect a Garmin GPS-20 or GPS-25 directly to a computer with a serial
interface and run xntp from that?

2.
If the answer to 1 is 'yes', what accuracy should I expect?

3.
What is the difference between the GPS-20 and -25?

4.
Given that the receivers can be connected directly, exactly how does the tac2
improve accuracy of these receivers? I understand that there is an issue about
the 1PPS signal being generated by the receivers. Isn't this signal suitable
for a serial interface?

5.
I'd like to get in touch with someone who has experience with xntp on any unix
platform.

6.
Are there any gotchas/questions I should have asked which are not present in
this mail?

Thanks,

Dag B

--
Dag Bakke   -   System Support Engineer, Silicon Graphics Norway
----
        Silicon Graphics Norge   tel: 67 11 46 01
        Postboks 178   fax: 67 11 47 01
        1324 Lysaker   email: dagb@oslo.sgi.com

18. Re: [TACGPS:1107] xntp -> gps-20 + tac2

From: Jeremy Bishop <jeremyb@canb.auug.org.au>
Date: Tue, 10 Mar 1998 22:55:49 +1100 (EST)
To: tacgps@tapr.org
Message-ID: <199803101155.WAA28349@pcug.org.au>
Rendered body type: text/plain

"Dag Bakke" <dagb@oslo.sgi.com> writes:

> I have a few questions regarding the subject, and I couldn't find a mailing
> list archive nor a FAQ at ftp://ftp.tapr.org/tapr/SIG/.
>
> If my qestions are answered in a faq or archive, *please* point me to it. It is
> not my intention to demonstrate bad netiquette by asking previously answered
> questions.....
>
>
> 1.
> Can I connect a Garmin GPS-20 or GPS-25 directly to a computer with a serial
> interface and run xntp from that?

Yes.

> 2.
> If the answer to 1 is 'yes', what accuracy should I expect?

Probably to ~100ms or so, but there will be lots of jitter due to the serial
processing (also dependent to some degree on your particular hardware and
O/S serial handling.

> 3.
> What is the difference between the GPS-20 and -25?

The -20 is a single channel receiver; the -25 is a 12-channel parallel
receiver. The -25 should acquire signals faster and give a more accurate
position and time solution.

> 4.
> Given that the receivers can be connected directly, exactly how does the tac2
> improve accuracy of these receivers? I understand that there is an issue about
> the 1PPS signal being generated by the receivers. Isn't this signal suitable
> for a serial interface?

The 1 PPS signal as it comes off the receivers is not a RS-232 signal.
The TAC board converts it into a RS-232 signal, normally on the Carrier
Detect line (CD). The accuracy is improved because the 1 PPS signal is
output precisely on the actual second, whereas the serial output occurs
sometime *after* the actual second. Using the 1 PPS signal should improve
the accuracy to 1ms or so, and significantly less jitter

> 5.
> I'd like to get in touch with someone who has experience with xntp on any unix
> platform.

There a several people on the TACGPS list who have done this, including
myself. I am using the Oncore VP + TAC-2 with Linux and Solaris. Also
check the comp.protocols.time.ntp newsgroup.

> 6.
> Are there any gotchas/questions I should have asked which are not present in
> this mail?

Kind of. Xntp is a complex beast - I certainly don't claim to understand it
fully. Lots of patience is useful when you get serious about precision
timekeeping :-)

Regards,
Jeremy

--
Jeremy Bishop
jeremyb@canb.auug.org.au
Australian Unix User Group (AUUG) Canberra Chapter

19. Re: [TACGPS:1107] xntp -> gps-20 + tac2

From: John Ackermann N8UR <jra@febo.com>
Date: Tue, 10 Mar 1998 08:23:06 -0500
To: tacgps@tapr.org
Message-ID: <199803101323.IAA23364@meow.febo.com>

Rendered body type: text/plain

I have been running xntpd on a Linux box using a TAC-2 with the Motorola
receiver. There's some info at http://www.febo.com/ntp that might be
useful. There's also a newsgroup, comp.protocols.time.ntp (I think...) that
has a pretty good signal to noise ratio.

John
jra@febo.com

In message <9803100906.ZM26682@dagb.oslo.sgi.com>, "Dag Bakke" writes:
>Hi all.
>
>I have a few questions regarding the subject, and I couldn't find a mailing
>list archive nor a FAQ at ftp://ftp.tapr.org/tapr/SIG/.
>
>If my qestions are answered in a faq or archive, *please* point me to it. It i
>s
>not my intention to demonstrate bad netiquette by asking previously answered
>questions.....
>
>
>1.
>Can I connect a Garmin GPS-20 or GPS-25 directly to a computer with a serial
>interface and run xntp from that?
>
>2.
>If the answer to 1 is 'yes', what accuracy should I expect?
>
>3.
>What is the difference between the GPS-20 and -25?
>
>4.
>Given that the receivers can be connected directly, exactly how does the tac2
>improve accuracy of these receivers? I understand that there is an issue about
>the 1PPS signal being generated by the receivers. Isn't this signal suitable
>for a serial interface?
>
>5.
>I'd like to get in touch with someone who has experience with xntp on any unix
>platform.
>
>6.
>Are there any gotchas/questions I should have asked which are not present in
>this mail?
>
>
>
>
>Thanks,
>
>Dag B
>
>
>
>--
Dag Bakke   -   System Support Engineer, Silicon Graphics Norway
>--
>   Silicon Graphics Norge   tel: 67 11 46 01
>   Postboks 178   fax: 67 11 47 01
>   1324 Lysaker   email: dagb@oslo.sgi.com

20. Re: [TACGPS:1107] xntp -> gps-20 + tac2

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Tue, 10 Mar 1998 13:50:11 +0000
To: tacgps@tapr.org, Dag Bakke <dagb@oslo.sgi.com>
Message-ID: <35054513.D2C7EF67@clark.net>
Rendered body type: text/plain

Dag Bakke wrote:
>
> Hi all.
>
> I have a few questions regarding the subject, and I couldn't find a mailing
> list archive nor a FAQ at ftp://ftp.tapr.org/tapr/SIG/.

The other repository is my aleph file server. Check
     ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/

Also, my older gps-timing mail list is archived on aleph -- set a

newsreader to news://aleph.gsfc.nasa.gov and then subscribe to gps-timing

Since Jeremy down under is one of the xntpd gurus, I'll only respond to
your hardware-related questions.

> [snip]
> 1.
> Can I connect a Garmin GPS-20 or GPS-25 directly to a computer with a serial
> interface and run xntp from that?

Yes, but you would need to add a wire to the cable to bring the 1PPS into the
computer. The "standard" is that the GPS rcvr's 1PPS signal goes onto the RS232
DCD line.

The connections to do this are documented on aleph. To do it just with wire,
see
the file named emulate.zip and see the tac-lite file for a description of a
simple
"real RS232" interface.

For the Motorola ONCORE (in addition to my "universal" ONCORE+Garmin+anything
else TAC-2 board), TAPR has Doug McKinney's simpler ONCORE interface board.
There has been some discussion of a similar "mini-TAC" board for the G-20/25.

> 2.
> If the answer to 1 is 'yes', what accuracy should I expect?

With either the -20 or -25, the GPS receiver produces timing pulses that are
accurate at the few microsecond level. The -20 performance as a precision
timing
source is documented in the various gar*.* files on aleph.

> 3.
> What is the difference between the GPS-20 and -25?

Recently I have been testing the -25's timing performance since TAPR now has
the
-25 available ($179, see the TAPR web pages). The difference between the -20
and -25 is like the difference between night and day. Where the -20 is slow to
lock up and marginal in performance, the -25 I have been trying is very robust
and reliable. Unless you have a compelling reason to use a -20 (like you
already
have one), go for the -25 if reliability is at all important to you. I've taken
to thinking of the -20 as a toy.

I am running timing tests on the -25 right this very minute and plan to post
the
results here RSN (Real! Soon! Now!). Wait a few days. [If someone needs to see
the work-in-progress plots immediately, I'll send it to you separately].

> 4.
> Given that the receivers can be connected directly, exactly how does the tac2
> improve accuracy of these receivers? I understand that there is an issue about
> the 1PPS signal being generated by the receivers. Isn't this signal suitable
> for a serial interface?

My TAC-2 is really an interface board. All the timing "magic" is in the
receiver
and in the software on the computer. The TAC-2 was intended as a "universal"
electrical/mechanical GPS interface. The TAC-2 provides:
   - Power conditioning
   - Low-impedance 1PPS signals for lab use
   - Isolated "real RS232" interface (some rcvrs, like the ONCORE have inverted
     "TTL" serial lines and need to be made RS232 compatible)
   - RS232 DCD 1PPS signal
   - Mechanical mounting
   - Interface for the (yet to be completed) TOC GPS disciplined crystal
oscillator
     (similar to, but cheaper than the HP58503, TARK 8812, etc).

But yes, you don't have to use the TAC, as described in the files on aleph that
I
pointed you to at the top of this message.

The real "accuracy improvement" we get (and my original reason for doing the
TAC)
comes in the way the receiver is configured and used. By delving into the
details
of what the DoD does to the GPS signals in SA (Selective Availability), and

capitalizing on some capabilities in some receivers (especially the ONCORE), we
have been able to "beat the DoD at their own game" and achieve timing precision
and accuracy at levels of a few tens of nanoseconds. These tricks are
irrelevant
to the GPS-20. The GPS-25 (advanced preview of the info I will post RSN) is not
as good as the ONCORE and has a few quirks, but by using a few tricks it looks
like it is a timing source with ~100 nsec precision and 1-2 microseconds
accuracy.

> 5.
> I'd like to get in touch with someone who has experience with xntp on any unix
> platform.

Not really my specialty -- see Jeremy's comments.

> 6.
> Are there any gotchas/questions I should have asked which are not present in
> this mail?

Well, I hope I outlined the issues. If you are buying a new unit, do not buy a
GPS-20 -- for a few $$$ more the -25 is a superior unit. For ~$100 more than
the GPS-25, the ONCORE is an excellent alternative.

Regards, Tom

21. DGPS RefSta thoughts

From: Jeff King <jeff@mich.com>
Date: Wed, 11 Mar 1998 13:02:40 -0500
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980311130240.039e1a90@mail.mich.com>
Rendered body type: text/plain

A thought came to me as I was starting to collect the parts to
put a DGPS RefSta on the air. I think the only person(s) that can
comment on this would be Steve and Tom, but I'll ask it of the
group anyways as the comments might be useful to all considering
putting a DGPS refsta on the air.

What kind of feedback do you get, as a group and individually,
from hams in your area considering your sending a beacon every
20 seconds? Historically, that has been frowned upon in my area
but certainly the fact that the beacon contains useful data
mitigates the effect. When I get the DGPS station up and running
I'm just wondering what kind of feedback I'll need to address based
on feedback others have already had that are running DGPS refstations.

Also, with regards to the MIC-E users on a repeater, I had
a thought. Would it be possible to modulate RTCM data on a subcarrier
on the output of the repeater? This data would be in addition to the
normal voice traffic (PLL tones at 10% modulation). This of course
would be at a much lower
data rate (lets say 50bps) using PLL tones being fsk'ed.

I did a project
like this for the NWS, and it seems that it might be useful here. I
imagine the data would need to be baud rate shifted to be used as a
DGPS input for a GPS, but this could be accomplished with a simple
PIC serial bit banger (I've done this, and yes I'd volunteer to do it
for TAPR). It might make for a nice addition to the MIC-E board.
Constructive comments please.

-Jeff wb8wka

22. Re: [TACGPS:1111] DGPS RefSta thoughts

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Wed, 11 Mar 1998 14:46:03 -0500
To: tacgps@tapr.org
Message-ID: <3506E9FB.B5BF778E@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Jeff King, WB8WKA wrote:
>
> A thought came to me as I was starting to collect the parts to
> put a DGPS RefSta on the air. I think the only person(s) that can
> comment on this would be Steve and Tom, but I'll ask it of the
> group anyways as the comments might be useful to all considering
> putting a DGPS refsta on the air.
>
> What kind of feedback do you get, as a group and individually,

> from hams in your area considering your sending a beacon every
> 20 seconds? Historically, that has been frowned upon in my area
> but certainly the fact that the beacon contains useful data
> mitigates the effect. When I get the DGPS station up and running
> I'm just wondering what kind of feedback I'll need to address based
> on feedback others have already had that are running DGPS refstations.

The longest experience base comes from W3IWI-13 on 145.79 in the
"APRS Hotbed" in the Balto/Wash area. The IWI-13 DGPS uses a
professional receiver (Trimble 4000SSE) operating at my GODE IGS
(International GPS Service) station near NASA Goddard; the interface
between the professional and amateur worlds is the RS232 output
connector on the 4000SSE. The amateur side is quite conventional --
a PK232 and IC-27 with a ~6dB "stick" at ~30 ft.

The IWI-13 QTH is pretty poor and it does not have good area coverage
(a prime desire of the IWI-13 DGPS bits was to cover the upper
Chesapeake Bay area. As a result, IWI-13 makes use of a WIDE digi
(WB4APR-1 in Annapolis); alas, the RF link to APR-1 is marginal,
so the signals go thru one intermediary (UNPROTO DGPS via N3IYI,WIDE).

I started IWI-13 with a 30 second DGPS rate. This was useless and
rejected by most user GPS receivers, so I went to 20 seconds. The
area APRS users hardly noticed the difference in channel loading.
At the time of the TAPR/ARRL DCC last October I dropped it to 15
seconds so that the visitors could see DGPS in action. It remains
at 15 seconds today. At the DCC, nobody complained, although there
were comments about how busy 145.79 is in the area. The best
observer of the situation at the time of the DCC was Steve Dimse
(K4HG) -- maybe he can comment.

Certainly the channels are busy. It's a pity that after 15 years
of Packet Racket, we amateurs are still stuck at 1200 baud, and that
our link reliability is so poor. But I know of no way to push the
community to make performance improvements unless they are pushed
hard. [IMHO -- I find the notion that we impede the development of
nifty new ideas by religiously adhering to inadequate, outmoded
standards to be morally repugnant! ;<}]

Personally, I think people would be very impressed with DGPS
performance if they could make use 5 second update rates.

Here in this area we plan to activate a second DGPS beacon soon. This
will use my "early beta" version of Steve's new low-cost TAPR widget
operating at Rick's (WB2TNL) QTH. This beacon will be on the new
144.39 frequency. Until the 145.79 -> 144.39 QSY occurs in this area,
we'll run it fairly fast -- probably 5 second rate.

73, Tom

23. Re: [TACGPS:1111] DGPS RefSta thoughts

From: Steve Dimse K4HG <k4hg@tapr.org>
Date: Wed, 11 Mar 1998 15:34:31 -0500
To: "Tom Clark" <clark@tomcat.gsfc.nasa.gov>, <tacgps@tapr.org>
Message-ID: <199803112034.OAA09267@tapr.org>
Rendered body type: text/plain

On 3/11/98 2:46 PM Dr Thomas A Clark (W3IWI) (clark@tomcat.gsfc.nasa.gov)
wrote:

>I started IWI-13 with a 30 second DGPS rate. This was useless and
>rejected by most user GPS receivers, so I went to 20 seconds. The
>area APRS users hardly noticed the difference in channel loading.
>At the time of the TAPR/ARRL DCC last October I dropped it to 15
>seconds so that the visitors could see DGPS in action. It remains
>at 15 seconds today. At the DCC, nobody complained, although there
>were comments about how busy 145.79 is in the area. The best
>observer of the situation at the time of the DCC was Steve Dimse
>(K4HG) -- maybe he can comment.
>
As a result of my work writing and monitoring APRServe, I think it is
safe to say that I have spent more time looking at the raw data, from
more different LANs, than anyone.

>From my time in Baltimore from DCC... The Baltimore LAN is always busy,
and having the APRS freaks in town for DCC made it worse. Still, I had no
trouble getting packets out from my handheld in the hotel room, up to the
IGate in New Jersey. The DGPS packets did not prevent anyone from fully
utilizing the network. This is a different question than whether they

ever caused QRM, but it is the important one to ask.

None of the networks I have observed are really saturated. Those that are close are so because of a combination of poor network design and poor operating practice. All have room for improvement, and IMHO, for the differential signals. To find out for sure we need to try...

That said, I am already facing problems from a local user who feels the DGPS signal is inappropriate, and will cause QRM. His arguments are theoretical, have no basis in fact, and amount to "I was there first, how dare you send so many packets". After trying to explain things rationally a couple times, I finally am ignoring him. I'm tired of everything I get involved in deteriorating into an argument!

There are a couple things to do to minimize the impact of the DGPS packets.

I think it is important to try to minimize the number of digis used in the signal. Two digi hops should be the absolute tops, with one or none much preferred, though not possibile in all situations. Ideal would be to place the DGPS at the digi, or another high site with long range. If not, then a low power transmitter with just enough juice to hit the digi, so that anyone near the DGPS transmitter isn't losing twice the bandwidth from the signal, and other users are able to override the signal.

I would like to see a PIC that can turn the DGPS signal on and off. For example, suppose every time the DGPS hears a packet containing "?DGPS?" it turns on the signal for 15 minutes. Any tracker or APRS user that needs the signals adds this to their beacon string, so while they are active and in range, the corrections are transmitted. It'd also be nice to have a signal like "XDGPSX" that would inactivate the signal for emergencies, special events, etc....though I can see the anti-DGPS folks sending that in their beacon....

Another thing I'd like to see is 2 (or more) rates out of the generator. I'd like to put a full time beacon up on 440 with packets every 5 seconds, for those who want the fast rate, and can afford the extra radio/tnc, but still have a slower rate signal for the primary APRS frequency.

Steve K4HG

24. Re: [TACGPS:1111] DGPS RefSta thoughts

From: "Lyle V. Johnson" <johnson@mmsi.com>
Date: Wed, 11 Mar 1998 14:21:08 -0700
To: clark@tomcat.gsfc.nasa.gov
Cc: tacgps@tapr.org
Message-ID: <35070044.C7AADCF4@mmsi.com>
Rendered body type: text/plain

Tom,

> Certainly the channels are busy. It's a pity that after 15 years
> of Packet Racket, we amateurs are still stuck at 1200 baud...
> Here in this area we plan to activate a second DGPS beacon soon.

Why not send the 5-second updates at 9600 bit/sec for your new beacon? The best way to push folks to use higher rates is to offer a useful sertvice for them to use, and this has to be viewed as useful to the APRS crowd...

--
Lyle Johnson Modular Mining Systems, Inc.
VP Product Eng 3289 East Hemisphere Loop
  Tucson AZ 85706-5028
Voice: +1.520.746.9127
FAX: +1.520.889.5790
Internet: johnson@mmsi.com

25. Re: [TACGPS:1113] Re: DGPS RefSta thoughts

From: Bob Bruninga <bruninga@nadn.navy.mil>
Date: Wed, 11 Mar 1998 16:39:28 -0500 (EST)
To: tacgps@tapr.org
Message-ID: <Pine.SOL.3.96.980311163618.18902O-100000@arctic>
Rendered body type: text/plain

I agree mostly with Steve's comments. Maybe sice the TAC box has a processor in it, IT can do the smart "on-demand" switching that APRS needs

to share DGPS on the main channel.

In this mode, you jsut connect its incoming serial port to its colocated
APRS digipeater. WHenever it sees the "request" for 5 minutes of DGPS, it
turns it on... I agree that there should be two rates. A 5 minute rate
for somene that needs a quick accurte fix, and then a longer say, 15
minute rate that he could re-trigger as Steve suggested...

I had proposed protocols in APRS for this switching and will have to go
back and dig it up...

APRSdos REPLY/COMMENT:

Reply mail addr: wb4apr@amsat.org
US mail address: 115 old Farm Ct, Glen Burnie, MD 21060
See DAYTON97 HISTORY: http://web.usna.navy.mil/~bruninga/dayton.html
See Maryland APRS LIVE: http://web.usna.navy.mil/~bruninga/aprs.html
See GPS on ANY radio: http://www.tapr.org/tapr/html/mic-e.html

26. prelim operational check

From: "Guy Story" <kc5goi@email.msn.com>
Date: Wed, 11 Mar 1998 22:12:10 -0600
To: <tacgps@tapr.org>
Message-ID: <020ed0820040c38UPIMSSMTPUSR01@email.msn.com>
Rendered body type: text/plain

Hello everyone. I am assembling a tac2 kit for a friend. I have performed
the operational check and have run into a problem. I have configured it for
the Garmin/oncore setup. When I installed the led it only lit up for 30
minuets or so then burned out. My guess it too much current. The reason it
was on so long is that when I jumpered pin 3 to 8 @ jp6, the led did not go
out. After some time I went on and checked the voltages for toggling. When
the led was supposed to be off I got the -10 volts @ pin 1 of p1, but the
led stayed lit. When the led was suppose to be on I got +10 volts @ pin 1
of p1. It also passes the checks at p3 on pins 7 and 9. Based on this I am
presuming that everything is okay. Has anyone run across this problem

Thanks and 73, KC5GOI

27. Re: DGPS RefSta thoughts

From: Pat Kilroy <pat.kilroy@gsfc.nasa.gov>
Date: Thu, 12 Mar 1998 09:59:41 -0500
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980312095941.007b56a0@pop700.gsfc.nasa.gov>
Rendered body type: text/plain

Lyle,

>> Certainly the channels are busy. It's a pity that after 15 years
>> of Packet Racket, we amateurs are still stuck at 1200 baud...
>> Here in this area we plan to activate a second DGPS beacon soon.
>
>Why not send the 5-second updates at 9600 bit/sec for your new beacon?
>The best way to push folks to use higher rates is to offer a useful
>sertvice for them to use, and this has to be viewed as useful to the
>APRS crowd...

This is not a bad idea! For some, a TNC like the kantronics
kpc-9600 plus that allows simultaneous reception of both 1200
and 9600 speeds would be attrtactive. A good stepping stone
to higher speeds.

Pat WD8LAQ
MDC Area

28. Re: [TACGPS:1114] Re: DGPS RefSta thoughts

From: John Rauch <johnr@cycat.com>
Date: Thu, 12 Mar 1998 18:54:25 -0500
To: tacgps@tapr.org
Message-ID: <350875B0.880418A2@cycat.com>
Rendered body type: text/plain

Why use a second channel for the 9600, when both 9600 and 1200 can be
used on the same channel, by the same radio, and can coexist to
encourage a TNC change only, not a system change. Some DXPacketCluster

Nodes have been doing this for years...

John Rauch, N4YXS
TAPR Member since '93

29. GPS-25 Images Updated

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Fri, 13 Mar 1998 01:35:19 -0600
To: " tacgps "<tacgps@tapr.org>
Message-ID: <v03130309b12e91d98a2a@[207.8.125.50]>
Rendered body type: text/plain

I finally had a chance to update the GPS-25 web page to show the new design
of the GARMIN units we have been carrying.

Take a look: http://www.tapr.org/gps

Greg

Greg Jones, WD5IVD Austin, Texas
wd5ivd@tapr.org http://www.tapr.org/~wd5ivd

"Even if you're on the right track, you'll get run over if you just sit
there."
-- Will Rogers

30. RTCM SC-104?

From: Helmut Bayerlein <na1035@fen.baynet.de>
Date: Fri, 13 Mar 1998 19:29:00 +0000
To: tacgps@tapr.org
Message-ID: <350988FC.60DA99C2@fen.baynet.de>
Rendered body type: text/plain

Hello All!
I'm new here at the SIG and I have a question about DGPS: does anybody
know how to get a description of the RTCM SC-104 Data format?
All information is welcome!
Thanks,
Helmut, dc3yc, from Germany

31. Re: [TACGPS:1119] GPS-25 Images Updated

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Fri, 13 Mar 1998 15:14:54 -0500
To: tacgps@tapr.org
Message-ID: <350993BE.58478B9@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Greg Jones, WD5IVD wrote:
>
> I finally had a chance to update the GPS-25 web page to show the new design
> of the GARMIN units we have been carrying.
>
> Take a look: http://www.tapr.org/gps
>
> Greg

(1) The ONCORE you show is not the one TAPR offers -- the current
rcvr is the one with shields installed.

(2) On Doug's VPIB, I believe that the one TAPR has is the newer
TAC-clone version with the extra 74AC04 IC.

(3) Personally, I think the DGPSIB should be shown with the required
ONCORE mounted.

(4) The new graphics (like the GPS constellation) are flashy &
impressive.

73, Tom

32. Re: [TACGPS:1121] Re: GPS-25 Images Updated

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Fri, 13 Mar 1998 14:49:35 -0600
To: tacgps@tapr.org
Message-ID: <v0313030eb12f4bb79ca1@[207.8.125.50]>
Rendered body type: text/plain

>Greg Jones, WD5IVD wrote:
>>
>> I finally had a chance to update the GPS-25 web page to show the new design
>> of the GARMIN units we have been carrying.
>>
>> Take a look: http://www.tapr.org/gps
>>
>> Greg
>
>(1) The ONCORE you show is not the one TAPR offers -- the current
>rcvr is the one with shields installed.

That is correct Tom. The photo on the page has the shields taken off so
people can see inside...the GPS-25 doesn't allow that easily. Also it is
an early model of the unit, but the layout is basically the same.

>(2) On Doug's VPIB, I believe that the one TAPR has is the newer
>TAC-clone version with the extra 74AC04 IC.

These are only power/interface kits. The TAC-2 is available for people
wanting to do timing.

>(3) Personally, I think the DGPSIB should be shown with the required
>ONCORE mounted.

It does on the web oage if you will go deeper into the system.

>(4) The new graphics (like the GPS constellation) are flashy &
>impressive.

Thanks.

Greg

Greg Jones, WD5IVD   Austin, Texas
wd5ivd@tapr.org   http://www.tapr.org/~wd5ivd

"Even if you're on the right track, you'll get run over if you just sit
there."
                -- Will Rogers

33. Re: [TACGPS:1121] Re: GPS-25 Images Updated

From: "Steven R. Bible" <srbible@gate.net>
Date: Fri, 13 Mar 1998 15:56:27 -0500
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19980313155627.008109e0@pop.gate.net>
Rendered body type: text/plain

At 02:16 PM 3/13/98 -0600, you wrote:
>Greg Jones, WD5IVD wrote:
>>
>> I finally had a chance to update the GPS-25 web page to show the new design
>> of the GARMIN units we have been carrying.
>>
>> Take a look: http://www.tapr.org/gps
>>
>> Greg
>
>(1) The ONCORE you show is not the one TAPR offers -- the current
>rcvr is the one with shields installed.

I sent some new pictures to Greg. I know he's been busy with other
priorities and will get to RSN :-)

>(2) On Doug's VPIB, I believe that the one TAPR has is the newer
>TAC-clone version with the extra 74AC04 IC.

We're transitioning over to Doug's new board at this time. He's busy
writing the documentation.

>(3) Personally, I think the DGPSIB should be shown with the required
>ONCORE mounted.

But it does on the DGPSIB page. Do you mean on the GPS page? Don't want
folks thinking that the price includes the Oncore.

>(4) The new graphics (like the GPS constellation) are flashy &
>impressive.

Greg and I worked on that. Nova made the basis and Greg did the rest.

 - Steve, N7HPR
 (n7hpr@tapr.org)

34. DGPS mailing list?

From: Jeff King <jeff@mich.com>
Date: Fri, 13 Mar 1998 19:16:41 -0500
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980313191641.00b6e560@mail.mich.com>
Rendered body type: text/plain

Anyone aware of a DGPS mailing list? I had heard there was one
but the fellow who mentioned it to me never got back to me
with details.

-Jeff

35. Re: [TACGPS:1124] DGPS mailing list?

From: "Steven R. Bible" <srbible@gate.net>
Date: Fri, 13 Mar 1998 19:55:54 -0500
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19980313195554.00826700@pop.gate.net>
Rendered body type: text/plain

At 06:17 PM 3/13/98 -0600, you wrote:
>Anyone aware of a DGPS mailing list? I had heard there was one
>but the fellow who mentioned it to me never got back to me
>with details.

Jeff, we are discussing DGPS here on TACGPS. There's not enough list
avaiable on the TAPR listserver, thus we thought that the discussion of
DGPS on the TACGPS would work.

 - Steve, N7HPR
 (n7hpr@tapr.org)

36. TAC32 Version 1.2.0 is available

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Fri, 13 Mar 1998 21:07:01 -0500
To: <tacgps@tapr.org>, "'DGPS List'" <dgps@tomcat.gsfc.nasa.gov>
Message-ID: <199803140303.WAA07445@gw.cnssys.com>
Rendered body type: text/plain

All TAC32 testers,

Version 1.2.0 of the TAC32 software is now available at
http://www.cnssys.com/tac32/

Version 1.2.0, March 13, 1998: This release marks the end of the Beta phase
of TAC32's development. As of this date TAC32 is now an official product.
Individual and academic users should contact TAPR for purchasing information
at tapr@tapr.com. Commercial users should contact CNS Systems at
info@cnssys.com.

Initialization: TAC32 now shows the main window immediately on startup. The
status bar displays information on the progress of the initialization
process, while the clock display shows "Initializing..."

Help: Added a new section called "How to Synchronize Other Windows 95, 98
and NT Computers to This One..." This section describes the use of the Net
Time command.

GPS Receiver Setup: Changed the names of the default settings buttons from
"Nav" and Timing" to "Navigation" and "Timing or DGPS" respectively. Changed
the operation of the "Timing or DGPS" button to select Highest-in-Sky
geometry for Motorola receivers and 2-D Nav for Garmin receivers.

Rick
WB2TNL

37. Re: [TACGPS:1125] Re: DGPS mailing list?

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Fri, 13 Mar 1998 20:39:25 -0600
To: tacgps@tapr.org
Message-ID: <v03130303b12f9d361964@[207.8.125.50]>
Rendered body type: text/plain

To followup on Steve's comments -- we have space for more lists, we just feel that we don't need to split these topics up at this time to different lists. Due to the fact that the overlap in projects and people doing things are pretty close at this time.

TACGPS list is being used for:
TAC-2 Q&A
GPS General Questions
DGPS Kit and Issues
GPS-25 and GPS-20 Support
Oncore VP Support
TAC32 Support

When the TOC is made available, it will be supported on this list as well.

Cheers - Greg

>At 06:17 PM 3/13/98 -0600, you wrote:
>>Anyone aware of a DGPS mailing list? I had heard there was one
>>but the fellow who mentioned it to me never got back to me
>>with details.
>
>
>Jeff, we are discussing DGPS here on TACGPS. There's not enough list
>avaiable on the TAPR listserver, thus we thought that the discussion of
>DGPS on the TACGPS would work.
>
>
>
> - Steve, N7HPR
> (n7hpr@tapr.org)

Greg Jones, WD5IVD Austin, Texas
wd5ivd@tapr.org http://www.tapr.org/~wd5ivd

"Even if you're on the right track, you'll get run over if you just sit there."
-- Will Rogers

38. Re: [TACGPS:1120] RTCM SC-104?

From: Lyle Johnson <lylej@azstarnet.com>
Date: Fri, 13 Mar 1998 19:48:03 -0700
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980313194803.0093d100@pop.azstarnet.com>
Rendered body type: text/plain

At 01:35 PM 3/13/98 -0600, you wrote:
>Hello All!
>I'm new here at the SIG and I have a question about DGPS: does anybody
>know how to get a description of the RTCM SC-104 Data format?
>All information is welcome!
>Thanks,
>Helmut, dc3yc, from Germany

This is unfortunately copyrighted material and you must purchase it from RTCM. They have a Web Site.

73,

Lyle

39. Re: [TACGPS:1127] Re: DGPS mailing list?

From: "Steven R. Bible" <srbible@gate.net>
Date: Fri, 13 Mar 1998 22:15:52 -0500
To: tacgps@tapr.org

Message-ID: <3.0.1.32.19980313221552.00801100@pop.gate.net>
Rendered body type: text/plain

Yea, what he said :-).

- Steve

At 08:56 PM 3/13/98 -0600, you wrote:
>To followup on Steve's comments -- we have space for more lists, we just
>feel that we don't need to split these topics up at this time to different
>lists. Due to the fact that the overlap in projects and people doing
>things are pretty close at this time.
>
>TACGPS list is being used for:
>   TAC-2 Q&A
>   GPS General Questions
>   DGPS Kit and Issues
>   GPS-25 and GPS-20 Support
>   Oncore VP Support
>   TAC32 Support
>
>
>When the TOC is made available, it will be supported on this list as well.
>
>Cheers - Greg

 - Steve, N7HPR
 (n7hpr@tapr.org)

40. Re:RTCM SC-104?

From: □□□□□ <SDI00848@niftyserve.or.jp>
Date: Sat, 14 Mar 1998 22:37:00 +0900
To: tacgps@tapr.org
Message-ID: <199803141339.WAA21406@ms7.niftyserve.or.jp>
Rendered body type: text/plain

Hi.

I purchased RTCM SC104 standard book from http://www.navtechgps.com.

Hitoshi Kuwano, JM1OMH from JAPAN

41. Re: [TACGPS:1125] Re: DGPS mailing list?

From: Jeff King <jeff@mich.com>
Date: Sat, 14 Mar 1998 11:36:51 -0500
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980314113651.03ad3920@mail.mich.com>
Rendered body type: text/plain

Steve/Greg:

I should have been more clear. I'll rephrase. Is anyone aware of
a DGPS mailing list running anywhere in the world? Looking through
my messages, it was Tom W3IWI who mentioned to me there was such a
list but he never got back to me when I expressed interest in subscribing
to it (instructions on how and where). Hence, the message to this list.

Wasn't suggesting the DGPSrefsta discussion be moved off this list,
just looking for more info (I'm a info junkie).

Thanks

-Jeff

At 06:56 PM 3/13/98 -0600, Steven R. Bible wrote:
>At 06:17 PM 3/13/98 -0600, you wrote:
>>Anyone aware of a DGPS mailing list? I had heard there was one
>>but the fellow who mentioned it to me never got back to me
>>with details.
>
>
>Jeff, we are discussing DGPS here on TACGPS. There's not enough list
>avaiable on the TAPR listserver, thus we thought that the discussion of
>DGPS on the TACGPS would work.

```
-----------------------------------
| Jeff King      Aero Data Systems |
| jeff@mich.com  P.O. Box 510895   |
| (248)471-1787  Livonia, MI 48151 |
|F(248)471-0279  United States     |
-----------------------------------
```

42. DGPS and TAC

From: Jeff Vollin <barnie@flash.net>
Date: Sat, 14 Mar 1998 09:39:31 -0700
To: tacgps@tapr.org
Message-ID: <350AB2C1.37C7567E@flash.net>
Rendered body type: text/plain

Would a single Oncore GPS support both the new DGPS kit as well as the TAC?
I would have a hard time deciding which I would want if I could only do one.

Jeff Vollin, KC6WFU

43. TAC2 vs DGPS projects

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Sat, 14 Mar 1998 19:43:02 +0000
To: tacgps@tapr.org
Message-ID: <350ADDC6.BD34432@clark.net>
Rendered body type: text/plain

Answering two questions:

Jeff King (WB8WKA) wrote:
>
> Steve/Greg:
>
> I should have been more clear. I'll rephrase. Is anyone aware of
> a DGPS mailing list running anywhere in the world? Looking through
> my messages, it was Tom W3IWI who mentioned to me there was such a
> list but he never got back to me when I expressed interest in subscribing
> to it (instructions on how and where). Hence, the message to this list.

Jeff -- the error was mine. There has been a very small, private mailing
list (not maintained by TAPR) associated with some of the technical aspects
of developing the DGPS project. Somehow I fired off a response to you
thinking you were on that list -- sorry.

And Jeff Vollin (KC6WFU) asked
> Would a single Oncore GPS support both the new DGPS kit as well as the TAC?
> I would have a hard time deciding which I would want if I could only do one.

Jeff -- it depends on what aspects of the TAC you are interested in. First,
the Motorola ONCORE VP receiver used in the TAC & DGPS are identical.

HOW THEY ARE THE SAME:
If you want the TAC to keep your computer's clock synchronized, then the
DGPS board sends the 1PPS signal to the computer in a manner identical to
that I described in the "TAC Emulator" notes I put up some time ago on my
aleph file server at
   ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/emulate.zip
The 1PPS signal that the DGPS board sends to the computer's DCD pin is the
raw 0/+5V "TTL" level wich is adequate to "tickle" most RS232 ports fine;
the real TAC has "real RS232" line drivers.

Assuming that your computer is content with the 0/+5V levels, then all the
TAC support software (my old, historic MessDOS SHOWTIME & WB2TNL's much more
elegant W95/98/NT TAC32) will work just fine. In fact, TAC32 has been tweaked
to provide all the setup support for the DGPS application and I recommend
its use by anyone who is trying to get a DGPS board to work. Any of the other
computer applications of the TAC (like LINUX/UNIX xntpd daemons, time-tagging
of real-time seismic data, etc.) should also work (providing the computer in
question doesn't need "real RS232" line levels).

HOW THEY ARE DIFFERENT:
The intent of the TAC was more than just for use as a computer clock. The
TAC-2 board provides Low-Z, laboratory quality 1PPS signals which can be
used to synchronize atomic clocks anywhere in the world to the USNO's master
clock at levels of ~10-20 nanoseconds, and to steer the rate of these
time/frequency standards to levels of a small fraction of a part per billion
(to avoid a confrontation with my British colleagues, the previous statement
is correct whether you define a billion to be 10e9 or 10e12 !).

One of the TAC extensions that a lot of us have been thinking about is the use of the GPS to steer the frequency of a fairly good crystal oscillator to provide a low-cost alternative to a Rubidium frequency standard.

To understand this application, realize that a crystal oscillator is an excellent short-term frequency standard. You can multiply a cheap xtal oscillator like is used in your computer's clock all the way to S-Band and still hear a good CW note. But crystals age with time and drift with temperature and supply voltage, so they are not a particularly accurate clock.

On the other hand, GPS is an excellent long-term clock -- the GPS satellites accurately convey time kept by the USNO's master clock to levels of 1:10e13 each day; with the TAC project, we have developed the "tricks" to transfer this accuracy all the way to the user anywhere in the world. But the GPS system (the satellites and the receivers we use) yield (relatively) poor short-term stability -- much poorer than we get from the cheapest of crystal oscillators.

So one goal of the TAC project is to merge these two time domains -- picking the best of both worlds. Such units, often called "GPS Disciplined Oscillators" are available commercially -- the Hewlett-Packard HP58503 and the TRAK 8821 come to mind -- at costs in the $5000 range. The HP and TRAK units both use precisely the same Motorola ONCORE receiver that we use in the TAC & DGPS activities. A small group of us have been discussing just what widgets we need to do as well as (or maybe better than) the commercial units. Some discussion of theis topic can be heard in the RealAudio version of the material I presented at last October's TAPR/ARRL Digital Communication Conference available on the TAPR web site at
      http://www.tapr.org
and some of the slides (see especially the allanv.* plots) are on my aleph FTP server at
      ftp://aleph.gsfc.nasa.gov/GPS/tapr_dcc/

When I designed the TAC-2, I tried to anticipate this activity, and the TAC-2 has "hooks" for the planned TOC ("TAC Oscillator Controller"). Because the DGPS board was not designed for the same purpose, these "hooks" are something you would need to provide yourself (not an impossible task, but it means some work for you).

So I would summarize by saying that the TAC & DGPS projects are intended for very different purposes. But they share a lot of common hooks and are not incompatible (double negative used intentionally).

Hope that helped -- 73, Tom

44. Re: [TACGPS:1126] TAC32 Version 1.2.0 is available

From: "Charles E. Heisler K3VDB" <cheisler@cyberia.com>
Date: Sat, 14 Mar 1998 20:40:59 -0500
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19980314204059.006a2904@cyberia.com>
Rendered body type: text/plain

At 08:10 PM 3/13/98 -0600, you wrote:
>All TAC32 testers,
>
>Version 1.2.0 of the TAC32 software is now available at
>http://www.cnssys.com/tac32/
------------------------------SNIP------------------------------

        Rick;.....ver 1.2.0 is working great with the Garmin. (except for the
 nag screen). (small dig). Seriously, thanks for a great program. I hope you
 have good success with it in the commercial market.

        -73- Charlie
             K3VDB

45. RE: TAC32 Version 1.2.0 is available

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sat, 14 Mar 1998 21:03:42 -0500
To: <tacgps@tapr.org>
Message-ID: <199803150201.VAA12181@gw.cnssys.com>
Rendered body type: text/plain

Charlie,

I would like to point out that TAPR is now marketing TAC32 to the non-commercial market. All proceeds go to help support TAPR's research and development efforts. I get no royalties. However, I will continue TAC32

development and the updates will continue to be available as always. By
paying TAPR for the software you will be supporting the continuing
developments that have benefit for us all. You will also become part of the
registered user mailing list.

Rick
WB2TNL

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Charles E.
Heisler K3VDB
Sent: Saturday, March 14, 1998 8:47 PM
To: tacgps@tapr.org
Subject: [TACGPS:1134] Re: TAC32 Version 1.2.0 is available

At 08:10 PM 3/13/98 -0600, you wrote:
>All TAC32 testers,
>
>Version 1.2.0 of the TAC32 software is now available at
>http://www.cnssys.com/tac32/
------------------------------SNIP------------------------------

        Rick;.....ver 1.2.0 is working great with the Garmin. (except for the
 nag screen). (small dig). Seriously, thanks for a great program. I hope
you
 have good success with it in the commercial market.

        -73- Charlie
             K3VDB

46. Re: [TACGPS:1133] TAC2 vs DGPS projects

From: Jeff Vollin <barnie@flash.net>
Date: Sat, 14 Mar 1998 22:12:56 -0700
To: tacgps@tapr.org
Message-ID: <350B6357.8BF8267C@flash.net>
Rendered body type: text/plain

Tom:
  I too am really more interested in the TOC project. What I was wondering is
whether the DGPS board
or the planned TOC hardware need to control the Oncore in some way in which they
would interfere
with each other or if the two boards just listen to outputs from the Oncore. If I
understand the TOC
I would guess it just uses the 1PPS output and does all the rest of its work
without any feedback
to the Oncore. I really have no idea what the DGPS board might need from the
Oncore (yet!).
(Just NMEA output sentences?)

Jeff Vollin

Tom Clark (W3IWI) wrote:

> And Jeff Vollin (KC6WFU) asked
> > Would a single Oncore GPS support both the new DGPS kit as well as the TAC?
> > I would have a hard time deciding which I would want if I could only do one.
>
> Jeff -- it depends on what aspects of the TAC you are interested in. First,
> the Motorola ONCORE VP receiver used in the TAC & DGPS are identical.
>
>

[snip - most of the good stuff removed for brevity]

> So I would summarize by saying that the TAC & DGPS projects are intended for
> very different purposes. But they share a lot of common hooks and are not
> incompatible (double negative used intentionally).
>
> Hope that helped -- 73, Tom

47. Re: [TACGPS:1135] RE: TAC32 Version 1.2.0 is available

From: "Steven R. Bible" <srbible@gate.net>
Date: Sun, 15 Mar 1998 06:57:20 -0500
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19980315065720.00855370@pop.gate.net>
Rendered body type: text/plain

At 08:10 PM 3/14/98 -0600, you wrote:
>Charlie,
>
>I would like to point out that TAPR is now marketing TAC32 to the
>non-commercial market. All proceeds go to help support TAPR's research and
>development efforts. I get no royalties. However, I will continue TAC32
>development and the updates will continue to be available as always. By
>paying TAPR for the software you will be supporting the continuing
>developments that have benefit for us all. You will also become part of the
>registered user mailing list.

I'd like to point out that this is Rick's generous contribution to TAPR's
R&D efforts. As many may have noticed, last year TAPR introduced more new
products than it has in recent past. This is in due part to folks like
Rick that spend a large part of their skills on efforts like TAC32. You
will see more products soon as they develop. Many of them are ideas people
have and TAPR can bring them to you in the form of kits, books, information
(web, PSR), listservers, etc. These are not possible without talented
people like Rick and member support through dues and TAPR products.
Remember, many TAPR products have 10% discounts for members. It all boils
down to support by the membership and shared talents. And, oh, thanks
again Rick!

 - Steve, N7HPR
 (n7hpr@tapr.org)

48. Great job

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Sun, 15 Mar 1998 09:54:05 -0500
To: "TAC-2 mail list" <tacgps@tapr.org>
Message-ID: <001301bd5022$37af7e00$421d5c18@john.tampabay.rr.com>
Rendered body type: text/plain

Rick -- TAC32 1.2.0 works great with my Garmin GPS20. The clock does stop
for a few second occasionally but resumes after a short delay. I assume this
is normal and probably caused by a momentary unlock.

I do intend to register my copy with TAPR right away.

Thanks again for a job well done.

Looking forward to TOC now with great anticipation.

John W4SF

49. Re: [TACGPS:1136] Re: TAC2 vs DGPS projects

From: Lyle Johnson <lylej@azstarnet.com>
Date: Sun, 15 Mar 1998 09:20:17 -0700
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980315092017.0088ca30@pop.azstarnet.com>
Rendered body type: text/plain

Jeff,

>to the Oncore. I really have no idea what the DGPS board might need from the
>Oncore (yet!).
>(Just NMEA output sentences?)

The DGPS board _creates_ RTCM correction messages from the Motorola Binary
Format output of the Oncore. Thus, it is Oncore-specific. To th ebest of
my knowledge, the Oncore is the only low-cost GPS engine that provides
differential correction outputs in _any_ format (although the Ashtech G8
looks like it might/could but it is not yet clear).

73,

Lyle

50. Re: [TACGPS:1139] Re: TAC2 vs DGPS projects

From: Dave Martindale <davem@cs.ubc.ca>
Date: Sun, 15 Mar 1998 09:15:06 -0800
To: tacgps@tapr.org
Message-ID: <l03130300b131bb7273ba@[198.162.38.159]>

Rendered body type: text/plain

Suppose that someone wanted all three functions simultaneously from a
single Oncore:

        - GPS stabilized oscillator (TOC)
        - time synchronization and receiver status to a PC (TAC)
        - DGPS corrections for transmission

What would be the best way of going about it? Would it be relatively
easy to connect the TOC oscillator to the DGPS board, which already provides
the other two functions? Or would it be best to start with the TAC/TOC
combination which were designed for each other, and then add the DGPS
board by borrowing the necessary signals from the TAC board?

        Dave

51. Horology -- A Washington DC area special

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Tue, 17 Mar 1998 05:05:21 +0000
To: TACGPS <tacgps@tapr.org>
Message-ID: <350E0491.D46CA943@clark.net>
Rendered body type: text/plain

No -- this title does not refer to Ladies of the Night being involved
in another presidential scandal!

Horology is the science of timekeeping. One of the most fascinating
horological tales around concerns one of my heroes and dates from
the early 1700's in England. The individual's name was John Harrison.
The English Parliament offered a princely prize to the first person
who could solve the problem of sailors knowing what time it was (and
hence, from observations with simple sextants, what is the ship's
longitude) with enough accuracy to navigate to a few miles.

Two general approaches were advocated -- complicated observations of
the moon and stars, and having a good clock in the first place.
John Harrison developed several marine chronometers with unprecedented
(for the 1700's) accuracy and attempted to claim the prize.

The story of the English bureaucracy continuing to thwart his claim
is told in an excellent book called LONGITUDE, written by Dava Sobel,
which I highly recommend to all. I have recently seen it in paperback
in the local bookstores.

I learned today that on Monday, April 6th, Dava Sobel will be
appearing at the weekly NASA Goddard Engineering Colloquium with a
presentation entitled LONGITUDE. I have no further details, but I
imagine the subject will be John Harrison's story.

Anyone who will be in the MD/DC area 3 weeks hence is encouraged to
attend -- the time is 15:30 in the GSFC Bldg 3 auditorium. If you
plan to attend, contact me off-line and I'll tell you how to get
thru the Goddard gate.

FYI -- Dava is a science reporter with the New York Times, and she
lives in East Hampton, NY.

73, Tom

52. Re: [TACGPS:1141] Horology -- A Washington DC area special

From: "Doug McKinney" <buoy@redshift.com>
Date: Mon, 16 Mar 1998 23:38:43 -0800
To: <tacgps@tapr.org>
Message-ID: <001c01bd5177$b8831b80$9bc6cccf@buoy.mcktech.com>
Rendered body type: text/plain

-----Original Message-----
From: Tom Clark (W3IWI) <tac@clark.net>
To: tacgps@tapr.org <tacgps@tapr.org>
Date: Monday, March 16, 1998 9:13 PM
Subject: [TACGPS:1141] Horology -- A Washington DC area special

>No -- this title does not refer to Ladies of the Night being involved
>in another presidential scandal!
>
>Horology is the science of timekeeping. One of the most fascinating
>horological tales around concerns one of my heroes and dates from

>the early 1700's in England. The individual's name was John Harrison.
>The English Parliament offered a princely prize to the first person
>who could solve the problem of sailors knowing what time it was (and
>hence, from observations with simple sextants, what is the ship's
>longitude) with enough accuracy to navigate to a few miles.
>
>Two general approaches were advocated -- complicated observations of
>the moon and stars, and having a good clock in the first place.
>John Harrison developed several marine chronometers with unprecedented
>(for the 1700's) accuracy and attempted to claim the prize.
>
>The story of the English bureaucracy continuing to thwart his claim
>is told in an excellent book called LONGITUDE, written by Dava Sobel,
>which I highly recommend to all. I have recently seen it in paperback
>in the local bookstores.
>
>I learned today that on Monday, April 6th, Dava Sobel will be
>appearing at the weekly NASA Goddard Engineering Colloquium with a
>presentation entitled LONGITUDE. I have no further details, but I
>imagine the subject will be John Harrison's story.
>
>Anyone who will be in the MD/DC area 3 weeks hence is encouraged to
>attend -- the time is 15:30 in the GSFC Bldg 3 auditorium. If you
>plan to attend, contact me off-line and I'll tell you how to get
>thru the Goddard gate.
>
>FYI -- Dava is a science reporter with the New York Times, and she
>lives in East Hampton, NY.
>
>73, Tom
>

Tom, I am returning to Wallops Island (to recover a buoy) and should be in
Baltimore (BWI) on the 6th. I said should, because the date could change.
I have a Wallops Island pass and I am a retire Commander USN. So keep me
informed.
73's
Doug

53. Re: [TACGPS:1141] Horology -- A Washington DC area special

From: John Franke <j.m.franke@larc.nasa.gov>
Date: Tue, 17 Mar 1998 06:22:17 -0500 (EST)
To: tacgps@tapr.org
Message-ID: <v03020901b133c5f422c9@[128.155.59.12]>
Rendered body type: text/plain

Tom,

Thanks for the heads up. I managed to read her book when it first came
out. Have you read "Greenwich Time and the Longitude," by Philip Wilson
yet? I do not think that I will have a problem with the gate, I'll use my
LaRC badge. Hope to see you there.

Thanks, again,

John   WA4WDL

John M. Franke
Senior Technologist
NASA Langley Research Center
Technology Applications Group
3 Langley Blvd, MS200
Hampton, VA 23681-2199

Voice: 757 864 4623
Fax: 757 864 8314
E-mail: j.m.franke@larc.nasa.gov

54. Need Help With Antenna Selection

From: Kenneth Lerman <Kenneth.Lerman@lerman.nai.net>
Date: Tue, 17 Mar 1998 09:41:45 -0500 (EST)
To: tacgps.tapr.org@lerman.nai.net
Cc: lerman@lerman.nai.net (Kenneth Lerman)
Message-ID: <199803171441.AA01743@lerman.nai.net>
Rendered body type: text/plain

I've recently purchased a Motorola Oncore from TAPR, but have
ignored the issue of an antenna.

Some questions:

1 -- What antenna would you recommend? Where can I buy it? ...

2 -- Where can I get a matching connector for the card? Since I plan
     to put the card in a box, an adaptor to some convenient standard
     (like bnc) might be the way to go.

3 -- I've seen the Lowe antenna on their web page. To someone with
     as little knowledge of the subject as I have, it seems like it
     should do the job nicely. Any comments? Lowe also has an adaptor
     cable (for a Garmin receiver). Will that also fit the Motorola?

Thanks for any info you might provide.

Ken

--
Kenneth Lerman   Kenneth.Lerman@lerman.nai.net
Systems Essentials Limited   Fax: (203)426-9138
55 Main Street   Voice: (203)426-4430
Newtown, CT 06470   http://w3.nai.net/~lerman
PGP fingerprint = B1 66 29 FB CB 8C 6A 24 E1 DF B4 63 2C D6 5D AD

55. Re: [TACGPS:1143] Re: Horology -- A Washington DC area special

From: "Charles M. Coldwell" <coldwell@cfaiota0.harvard.edu>
Date: Tue, 17 Mar 1998 13:29:31 -0500
To: tacgps@tapr.org
Cc: tacgps@tapr.org
Message-ID: <199803171829.NAA01496@cfaiota0.harvard.edu>
Rendered body type: text/plain

Thanks for the heads up. I managed to read her book when it first came
   out. Have you read "Greenwich Time and the Longitude," by Philip Wilson
   yet?

I think the author's name is Derek Howse, unless there are two books
with the same title.

I must admit that I was very disappointed by Dava Sobel's book,
especially in comparison with "The Quest for Longitude" edited by
William Andrewes (proceedings of the longitude symposium held at
Harvard, Nov 4-6, 1993) which goes into a great deal more technical
detail about Harrison's marine timekeeper as well as his earlier work
with wooden regulators.

But I guess you can't argue about taste.

Chip

56. Re: [TACGPS:1143] Re: Horology -- A Washington DC area special

From: "Charles M. Coldwell" <coldwell@cfaiota0.harvard.edu>
Date: Tue, 17 Mar 1998 13:35:55 -0500
To: tacgps@tapr.org
Message-ID: <199803171835.NAA01502@cfaiota0.harvard.edu>
Rendered body type: text/plain

BTW, Dava Sobel's book is based on an article she wrote for the
Harvard alumni magazine about the Longitude Symposium, the proceedings
of which I mentioned in my earlier posting.

Despite my email address, the standard disclaimer applies; I am in no
way associated with Harvard's Collection of Historical Scientific
Instruments and I do not profit from sales of their books.

Chip

--

Charles M. Coldwell
Harvard-Smithsonian Center for Astrophysics
60 Garden St. MS #20
Cambridge, MA 02138
(617) 495-7491

57. GPS-20 Questions...

From: Alan Sanders <asand@erols.com>
Date: Tue, 17 Mar 1998 13:46:46 -0500

To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <01BD51AB.243432A0@207-172-251-86.s23.as3.loc.erols.com>
Rendered body type: text/plain

O.K., O.K.,... I know it's only a GPS-20 but,...

Why is it that sometimes the sensor board is not aware of all the available SV's. For instance right now, (March 17, 1998 18:36:00 UTC), I know there are 7 birds visible from my position:

http://sirius.chinalake.navy.mil/cgi-bin/satpred-query
There are 7 satellites in view:

SV	Elevation	Azimuth
2	43.9°	306.2°
7	24.2°	249.9°
13	11.2°	245.2°
15	56.7°	115.5°
19	45.8°	186.5°
27	62.5°	251.8°
31	37.8°	52.7°

Yet my GPS-20 (SW Ver 2.04) doesn't know to look for 13 & 31.
Why?

58. Re: [TACGPS:1145] Re: Horology -- A Washington DC area special

From: "Gordon T. Uber" <gordon@ubr.com>
Date: Tue, 17 Mar 1998 11:16:14 -0800
To: <tacgps@tapr.org>
Message-ID: <199803171916.LAA13686@proxy4.ba.best.com>
Rendered body type: text/plain

Philip Wilson is the publisher. Derek Howse is the author. The revised edition has many color figures added; the text is, I think, the same.

Gordon
--
| XII | Gordon T. Uber, 3790 El Camino Real, Suite 142
| XI | Palo Alto, CA 94306-3314, email: gordon@ubr.com
| X \ /| CLOCKS and TIME: http://www.ubr.com/clocks/
| IX \ / | Reynen & Uber WebDesign: http://www.ubr.com/rey&ubr

---
> From: Charles M. Coldwell <coldwell@cfaiota0.harvard.edu>
> To: tacgps@tapr.org
> Subject: [TACGPS:1145] Re: Horology -- A Washington DC area special
> Date: Tuesday, March 17, 1998 10:39 AM
>
>
> Thanks for the heads up. I managed to read her book when it first came
> out. Have you read "Greenwich Time and the Longitude," by Philip Wilson
> yet?
>
> I think the author's name is Derek Howse, unless there are two books
> with the same title.

59. Re: [TACGPS:1147] GPS-20 Questions...

From: Dave Martindale <davem@cs.ubc.ca>
Date: Tue, 17 Mar 1998 11:31:28 -0800
To: tacgps@tapr.org
Message-ID: <l03130301b1347f429c6c@[198.162.38.159]>
Rendered body type: text/plain

>Why is it that sometimes the sensor board is not aware of all the available SV's. For instance right now, (March 17, 1998 18:36:00 UTC), I know there are 7 birds visible from my position:

Has it been on recently? Perhaps its almanac is out of date.

I once observed the same thing with a GPS 12XL and 45XL. The 45XL hadn't been used for a long time, while the 12XL had been on not long before (a few days). The 12XL initially knew about SV's that the 45XL didn't - not just ones close to the horizon that the 12XL normally displays while the 45XL doesn't, but ones high in the sky.

After leaving both units on for half an hour or so, they both agreed about what higher-elevation SVs were available.

>There are 7 satellites in view:
>SV Elevation Azimuth

> 2   43.9°   306.2°
> 7   24.2°   249.9°
>13   11.2°   245.2°
>15   56.7°   115.5°
>19   45.8°   186.5°
>27   62.5°   251.8°
>31   37.8°   52.7°
>
>Yet my GPS-20 (SW Ver 2.04) doesn't know to look for 13 & 31.

Also, check NANUs to see if either 13 or 31 is currently out of
service.

        Dave

60. Re: [TACGPS:1145] Re: Horology -- A Washington DC area special

From: John Franke <j.m.franke@larc.nasa.gov>
Date: Tue, 17 Mar 1998 14:42:52 -0500 (EST)
To: tacgps@tapr.org
Message-ID: <v03020908b1343aef9ece@[128.155.59.12]>
Rendered body type: text/plain

It is egg on face time for me. Of course the author is Derek Howse. When
I wrote the note, I just glanced up to the book shelf and hastily copied
the publisher's name instead of the author's.

I too prefer a more technical treatise, but it is nice to see the political
side too.

I have not read "The Quest for Longitude" yet. It is on my list.

John

>   Thanks for the heads up. I managed to read her book when it first came
>   out. Have you read "Greenwich Time and the Longitude," by Philip Wilson
>   yet?
>
>I think the author's name is Derek Howse, unless there are two books
>with the same title.
>
>I must admit that I was very disappointed by Dava Sobel's book,
>especially in comparison with "The Quest for Longitude" edited by
>William Andrewes (proceedings of the longitude symposium held at
>Harvard, Nov 4-6, 1993) which goes into a great deal more technical
>detail about Harrison's marine timekeeper as well as his earlier work
>with wooden regulators.
>
>But I guess you can't argue about taste.
>
>Chip

61. Re: [TACGPS:1147] GPS-20 Questions...

From: John Franke <j.m.franke@larc.nasa.gov>
Date: Tue, 17 Mar 1998 14:49:30 -0500 (EST)
To: tacgps@tapr.org
Message-ID: <v03020909b1343d9b3f7a@[128.155.59.12]>
Rendered body type: text/plain

Just a guess, how old is the stored almanac in your receiver? I ask
because 31 was not useable on Mar 7 or 8. Let everything run for at least
15 minutes and see if there is any change. Keep me posted,

John

>O.K., O.K.,... I know it's only a GPS-20 but,...
>
>Why is it that sometimes the sensor board is not aware of all the
>available SV's. For instance right now, (March 17, 1998 18:36:00 UTC), I
>know there are 7 birds visible from my position:
>
>http://sirius.chinalake.navy.mil/cgi-bin/satpred-query
>There are 7 satellites in view:
>SV Elevation   Azimuth
> 2   43.9°   306.2°
> 7   24.2°   249.9°
>13   11.2°   245.2°
>15   56.7°   115.5°
>19   45.8°   186.5°
>27   62.5°   251.8°

>31   37.8°   52.7°
>
>Yet my GPS-20 (SW Ver 2.04) doesn't know to look for 13 & 31.
>Why?

62. Station HELTH?

From: Hitoshi Kuwano <SDI00848@niftyserve.or.jp>
Date: Wed, 18 Mar 1998 09:26:00 +0900
To: tacgps@tapr.org
Message-ID: <199803180027.JAA22286@ms7.niftyserve.or.jp>
Rendered body type: text/plain

Hello.

 I ordered TAPR DGPS KIT, and I am waiting to enjoy the arrival.
 There is one question here.

 Although there is item called "STATION HELTH" in RTCM SC-104, as
 for setting value in KIT what kind of handling does it become?

Hitoshi Kuwano, JM1OMH

63. Motorola GPS

From: Glenn Little <glittle@awod.com>
Date: Tue, 17 Mar 1998 19:44:08 -0500
To: tacgps@tapr.org
Message-ID: <3.0.5.16.19980317194408.47ff213e@awod.com>
Rendered body type: text/plain

Does anyone know what the capabilities of a Motorola T5398A GPS is??

I have one that was bought used with what appears to be a new antenna.
The GPS itself is in a metal box with mounting flanges. It has a DB-9
connector for data and power and a BNC for antenna.

Any help greatly appreciated.

73

Glenn Little   glittle@awod.com   QCWA LM 28417
Amateur Callsign: WB4UIV   wb4uiv@amsat.org   AMSAT LM 2178
QTH: Goose Creek, SC USA (EM92xx)   ARRL TAPR
---

64. Re: [TACGPS:1153] Motorola GPS

From: gregory.beat@mediaone.net
Date: Tue, 17 Mar 1998 19:54:55 -0600
To: <tacgps@tapr.org>
Message-ID: <000f01bd5210$daaf0720$1a968318@beatgr.ce.mediaone.net>
Rendered body type: text/plain

Glenn,

>From your verbal description you probbaly have a Motorola GPS Evaluation
kit. I have started to see the GPS Evaluation kits for the PVT-6 GPS
receiver appearing at hamfests (Wheaton Hamfest here in Chicago area -
January). I have attached the Oncore GPS Evalaution Kit brochure (PDF file)

The Motorola Evaluation kits are designed to allow new GPS users to easily
test, evaluate, and develop with Motorola's GPS receivers. The original kit
includes all of the cables, manuals, accessories, and software you need to
be up and running with GPS in minutes. Evaluation kits were originally
available for the first GPS receivers (PVT-6 ?) and are currently available
for the GT Plus Oncore (GTEVAL0002) and the UT Plus Oncore (UTEVAL0002).

Here is Motorola's web page for Oncore products:
http://www.mot.com/AECS/PNSB/products/pnsbprod.html

Hope that helps get you started. TAPR and Tom Clark likely has some
additional references that may be useful.

G. Beat
W9GB
[Attachment: gt_uteval.pdf; application/pdf; 179,122 bytes]

65. RE: [TACGPS:1151] Re: GPS-20 Questions...

From: Alan Sanders <asand@erols.com>
Date: Tue, 17 Mar 1998 21:45:49 -0500
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <01BD51EE.10B1DC80@207-172-164-174.s47.as4.loc.erols.com>
Rendered body type: text/plain

Dave & John,... interesting thoughts but the receiver is on almost continuously. It had been on about 18 hours when I first observed the anomaly. So it <shouldn't> be an almanac issue.

I checked the NANU's, and if I read them correctly the two birds in question are healthy.

I actually never looked at this subject this closely before, so it's possible that it has been happening all along. I'd be interested in learning what other users are seeing.

66. Message subjects/threading

From: "Chris Johnson" <cjohnson@ipapilot.org>
Date: Tue, 17 Mar 1998 22:11:40 -0500
To: <tacgps@tapr.org>
Message-ID: <015001bd521b$9bb88e00$578648a6@lappy>
Rendered body type: text/plain

I've been following this list for a few weeks, and one thing that I've found a little annoying is that the list server inserts a serial number in the subject, which prevents my mail reader from threading the messages. Without the numbers, my mail reader would see that a follow-up to a message had the same subject as a previous message, and would make a thread out of them. The numbers make every subject different, which makes things much harder to follow.

Is there any way for the list server not to do this? Is there any good reason for it?

If anyone is using procmail to filter his mail, the following recipe removes the extra stuff from the subject. It'd be better not to have to do this though.

```
:O:
* ^Subject: \[TACGPS:[0-9]+\] \/.*$
| formail -I"Subject: $MATCH" >> $DEFAULT
```

Thanks.

Chris Johnson

67. Re: [TACGPS:1156] Message subjects/threading

From: "Steven R. Bible" <srbible@gate.net>
Date: Wed, 18 Mar 1998 07:43:46 -0500
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19980318074346.007f41a0@pop.gate.net>
Rendered body type: text/plain

At 09:28 PM 3/17/98 -0600, you wrote:
>I've been following this list for a few weeks, and one thing that I've
>found a little annoying is that the list server inserts a serial number in
>the subject, which prevents my mail reader from threading the messages.
>Without the numbers, my mail reader would see that a follow-up to a
>message had the same subject as a previous message, and would make a
>thread out of them. The numbers make every subject different, which makes
>things much harder to follow.
>
>Is there any way for the list server not to do this? Is there any good
>reason for it?

I for one like the header as I receive several lists. It allows me to sort them into separate mailboxs. And yes I know that I cannot sort by subject. But I can still do a search on keyword, which is what I do.

TAPR will be moving to another listserver in the near future.

- Steve, N7HPR
(n7hpr@tapr.org)

68. interface garmin50

From: peter van daalen <peter@vandaalen.demon.nl>
Date: Wed, 18 Mar 1998 16:06:47 +0100
To: tacgps@tapr.org
Message-ID: <350FE307.D78DD8BF@vandaalen.demon.nl>
Rendered body type: text/plain

(How) could a garmin50gps (oldie) be interfaced to TAC ?
Thanks for help.

Peter , PE1ECM
Amsterdam

69. Re: [TACGPS:1158] interface garmin50

From: clark@tomcat.gsfc.nasa.gov (Tom Clark -- W3IWI)
Date: Wed, 18 Mar 98 16:43:06 UTC
To: tacgps@tapr.org
Message-ID: <55972@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

PE1ECM asked
> (How) could a garmin50gps (oldie) be interfaced to TAC ?
> Thanks for help.

Basically, the answer is that it can't. The TAC hardware is an interface board for board-level (OEM) GPS receivers that generate a hardware 1PPS signal. The TAC as a concept involves different things to do with the hardware. A lot of my TAC-related effort is to quantify just how accurate the hardware 1PPS signal is (at the microsecond to sub-microsecond level) and how do we use the various receivers to defeat the effects of Selective Availability on accurate timing. In addition to such "laboratory quality" 1PPS activities, the TAC architecture also provides a precise 1PPS signal to the host computer which can be used for accurate computer & network timing.

I believe that the GPS-50 (and this is also true of all the handheld machines out there) lacks any hardware-generated timing signals. Its only output is the RS232 NMEA messages, which can only be used for timing at the 0.5-1 second level.

73, Tom

70. RE: [TACGPS:1147] !!! GPS-20 Questions...

From: Alan Sanders <asand@erols.com>
Date: Thu, 19 Mar 1998 12:10:23 -0500
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <01BD5330.398E3AC0@207-172-251-247.s56.as2.loc.erols.com>
Rendered body type: text/plain

This is beginning to get a little strange,...

I had begun to randomly compare the predictions of SV's overhead with the reports from my GPS-20 when I began to suspect a pattern.

I think my receiver is just ignoring PRN 13 & 31 !!! (possibly others)
Right now they should both be well overhead but are not being looked for.
So I told my recv. to dump the almanac data. (not easy for me to do) ...

Well,... the data line for #13 is all NULL's
There is no line for 31

Am I missing something?

71. Re: [TACGPS:1160] RE: !!! GPS-20 Questions...

From: Dave Martindale <davem@cs.ubc.ca>
Date: Thu, 19 Mar 1998 09:30:25 -0800
To: tacgps@tapr.org
Message-ID: <l03130300b137058d59b2@[198.162.38.159]>
Rendered body type: text/plain

>I think my receiver is just ignoring PRN 13 & 31 !!! (possibly others)
>Right now they should both be well overhead but are not being looked for.
>So I told my recv. to dump the almanac data. (not easy for me to do) ...
>
>Well,... the data line for #13 is all NULL's
>There is no line for 31

It does seem that the almanac in your 20 is bad. I have an almanac saved on March 8, and it shows both 13 and 31 as live and working. 13 and 31 are overhead here right now, let me go out and grab a new almanac.

72. Re: [TACGPS:1160] RE: !!! GPS-20 Questions...

From: Robert Winingham <kc5ejk@onramp.net>
Date: Thu, 19 Mar 1998 11:58:15 -0600
To: tacgps@tapr.org

Message-ID: <v03102803b1370cab4530@[206.50.201.94]>
Rendered body type: text/plain

>This is beginning to get a little strange,...
>
>I had begun to randomly compare the predictions of SV's overhead with the reports from my GPS-20 when I
 began to suspect a pattern.
>
>I think my receiver is just ignoring PRN 13 & 31 !!! (possibly others)
>Right now they should both be well overhead but are not being looked for.
>So I told my recv. to dump the almanac data. (not easy for me to do) ...
>
>Well,... the data line for #13 is all NULL's
>There is no line for 31
>
>Am I missing something?
>

Try feeding two gps data strings into the sigplot.bas program
that is part of the DOS APRS download pkg. (www.tapr.org)
and posting the graph.

73

Bob - Dallas,TX --- kc5ejk@onramp.net or kc5ejk@amsat.org ---

73. Re: [TACGPS:1160] RE: !!! GPS-20 Questions...

From: Dave Martindale <davem@cs.ubc.ca>
Date: Thu, 19 Mar 1998 10:05:45 -0800
To: tacgps@tapr.org
Message-ID: <l03130301b1370d4028bb@[198.162.38.159]>
Rendered body type: text/plain

Oops. That last message was only half-complete when it got sent.

Anyway, I did go out and collect a new almanac just a few minutes ago.
It's included below. SVs 13 and 31 are definitely alive and kicking.

Try leaving your 20 on for at least 15 minutes with a completely unobstructed
view of part of the sky. It *should* collect a completely new almanac during
that period. To be sure, maybe give it 30 minutes. If the almanac is still
bad at the end of that time, something is wrong.

The almanac below was collected by a 12XL and formatted by MacGPS. If
you need it, I could let my 20 acquire a new almanac and then dump it
in ASCII, giving you what you need to upload a new almanac to your 20.
Let me know if you need that. But your 20 *should* acquire a new
almanac on its own, given a chance.

        Dave

Almanac Sat#   Week   TimeOA Af0(s) Af1(s/s)   Eccentricity   Sqrt(A(m))   Mean Anom.(°)
Arg.of Perigee(°)   Right Ascen.at TOA(°)   Rate of R.Ascen(°/s)   Inclination(°)
A   01   949   589824 4.2915344e-05   0   0.004131794   5153.5889   149.264031
-94.8513015   -28.3654324   -4.51836977e-07 54.760806
A   02   949   589824 -0.00046730042 -3.6379788e-12 0.017449379   5153.6172
-105.90166   -131.617814   87.4627785   -4.64278849e-07 53.7995013
A   03   949   589824 0.00011062622   3.6379788e-12   0.0019574165   5153.5952
54.0358702   136.778991   149.370595   -4.62969173e-07 54.452843
A   04   949   589824 1.8119812e-05   3.6379788e-12   0.0047168732   5153.6665
28.753925   -46.6473917   -148.764648   -4.57075681e-07 55.9593437
A   05   949   589824 0.0001411438   0   0.0011219978   5153.6504   39.6833683
-20.614643   88.4495564   -4.62314335e-07 53.9642967
A   06   949   589824 0   0   0.0065517426   5153.5166   73.6004588
-147.060093   151.440757   -4.60349871e-07 54.8679205
A   07   949   589824 0.0007724762   0   0.0095486641   5153.6104   -173.45417
-128.6472   149.564668   -4.57730519e-07 54.9922026
A   08   949   589824 0.00061607361   1.4551915e-11   0.010195732   5153.5825
-54.7961557   103.862903   31.755339   -4.55111167e-07 54.9067159
A   09   949   589824 -3.4332275e-05 0   0.0072178841   5153.647   64.3978034
18.4694548   29.7591103   -4.64933687e-07 54.0923559
A   10   949   589824 2.0027161e-05   0   0.0027637482   5153.6616   -96.128137
-16.8158199   -89.8629479   -4.51836977e-07 55.3317518
A   11   Poor Health   589824 2.0027161e-05   0   0.0027637482   5153.6616
-96.128137   -16.8158199   -89.8629479   -4.51836977e-07 55.3317518
A   12   Poor Health   589824 2.0027161e-05   0   0.0027637482   5153.6616
-96.128137   -16.8158199   -89.8629479   -4.51836977e-07 55.3317518
A   13   949   589824 0.00085353851   -7.2759576e-12 0.001950264   5153.7671
-35.8409225   -97.422854   -29.8095786   -4.49217625e-07 54.9805298
A   14   949   589824 2.7656555e-05   0   0.001057148   5153.6074   -172.099307

```
179.547915      -87.303717      -4.48562787e-07 55.6486384
A       15      949     589824  0.00053691864   3.6379788e-12   0.0069961548    5153.6353
-12.6912044     89.8400122      -146.542214     -4.54456329e-07 56.2563169
A       16      949     589824  5.4359436e-05   0       0.0028362274    5153.7188       -20.7067396
0.540647519     -86.979447      -4.50527301e-07 55.4426433
A       17      949     589824  -0.00017642975  0       0.0097346306    5153.5884       60.2656072
149.635607      -144.403067     -4.53146653e-07 56.3260122
A       18      949     589824  1.2397766e-05   0       0.0067572594    5153.687        -178.3193
97.567736       -31.7674182     -4.58385357e-07 54.1373293
A       19      949     589824  0.00038719177   3.6379788e-12   0.003798008     5153.6206
25.0687409      -166.642341     27.0768148      -4.74101419e-07 53.1495917
A       20      Poor Health     589824  0.00038719177   3.6379788e-12   0.003798008     5153.6206
25.0687409      -166.642341     27.0768148      -4.74101419e-07 53.1495917
A       21      949     589824  2.9563904e-05   3.6379788e-12   0.014101505     5153.6343
-82.4207875     -161.782046     -89.5103121     -4.51836977e-07 55.2943292
A       22      949     589824  5.3405762e-05   3.6379788e-12   0.010743618     5153.6128
-116.749803     17.6724963      88.2898871      -4.64933687e-07 53.7943513
A       23      949     589824  1.1444092e-05   0       0.012749195     5153.6694       -96.4770846
-117.473421     -87.3138394     -4.49872463e-07 55.4735431
A       24      949     589824  0.00081825256   1.0913936e-11   0.0080714226    5153.5635       52.31887
        -103.963238     -148.531684     -4.51182139e-07 56.5234251
A       25      949     589824  -6.6757202e-06  0       0.0069270134    5153.6689       127.733103
-147.445643     27.8236055      -4.68862715e-07 53.6844877
A       26      949     589824  -0.00015163422  5.8207661e-11   0.010317326     5153.5737
173.506612      -15.4216929     -29.4309368     -4.51182139e-07 54.9314344
A       27      949     589824  2.1934509e-05   0       0.012714863     5153.5615       5.75763005
-179.644357     28.8434039      -4.64933687e-07 53.9268741
A       28      Poor Health     589824  2.1934509e-05   0       0.012714863     5153.5615
5.75763005      -179.644357     28.8434039      -4.64933687e-07 53.9268741
A       29      949     589824  0.00032997131   4.0017767e-11   0.0060181618    5153.3823
133.305745      -113.614364     -30.9140475     -4.51836977e-07 54.7309342
A       30      949     589824  -3.0517578e-05  0       0.0052976608    5153.561        -104.497318
90.7463646      89.921872       -4.57730519e-07 54.3872698
A       31      949     589824  1.9073486e-06   0       0.0080924034    5153.5122       109.430053
41.6664864      149.649814      -4.58385357e-07 54.9602749
A       32      Poor Health     589824  1.9073486e-06   0       0.0080924034    5153.5122
109.430053      41.6664864      149.649814      -4.58385357e-07 54.9602749
```

74. Re: [TACGPS:1159] Re: interface garmin50

From: ChrisEilbeck <chris@yordas.demon.co.uk>
Date: Thu, 19 Mar 1998 18:20:09 +0000
To: tacgps@tapr.org
Message-ID: <351161D9.B9E6ED7B@yordas.demon.co.uk>
Rendered body type: text/plain

Tom Clark -- W3IWI wrote:

> A lot of my TAC-related effort is to quantify just how accurate
> the hardware 1PPS signal is (at the microsecond to sub-microsecond level)
> and how do we use the various receivers to defeat the effects of Selective
> Availability on accurate timing.

I've been doing some work recently on measuring differential timing errors
between two co-located Rockwell Jupiter receiver at the ns level. I don't
have a fixed reference to compare to the two 1PPS outputs but the lock
between the two receivers is more important to my application.

Drop me some mail and we can compare notes.

Chris

--
Chris Eilbeck
mailto:chris@yordas.demon.co.uk

75. DGPS REF STA vs. USCG DGPS

From: Boyd Prestwood <w2hob@mosquito.com>
Date: Thu, 19 Mar 1998 16:24:25 -0500
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19980319162425.006c07d8@mail.mosquito.com>
Rendered body type: text/plain

Hello all. I've ordered the new DGPS Ref Sta card from TAPR and I have an
Oncore just waiting to be attached! My question:

What's the difference in accuracy between the DGPS project card and one of
the DGPS shore stations maintained by the US Coast Guard down around
200-300 KHz. Does it all boil down to how accurately I tell my DGPS
project card about its own location?

Thanks for the help.
73 de Boyd W2HOB

76. Re: [TACGPS:1165] DGPS REF STA . got it

From: Robert Winingham <kc5ejk@onramp.net>
Date: Thu, 19 Mar 1998 20:55:19 -0600
To: tacgps@tapr.org
Message-ID: <v03102800b13789064c4e@[206.50.201.94]>
Rendered body type: text/plain

>Hello all. I've ordered the new DGPS Ref Sta card from TAPR and I have an
>Oncore just waiting to be attached! :
>

I got mine via UPS today March 19. The TAPR Motorola 97 antenna,
 I got in the same order, is working well inside my Condo.

Now to remove the Oncore from the TAC-2 and get this working.

1. I saw no way to order/pay for the tac32 program on the TAPR
    web order page.

2. Can we get Ron W5RKN to write a TAC MAC version? :-)

73

Bob - Dallas,TX --- kc5ejk@onramp.net or kc5ejk@amsat.org ---

77. Re: [TACGPS:1166] Re: DGPS REF STA . got it

From: "Ronald G. Parsons" <w5rkn@amsat.org>
Date: Fri, 20 Mar 1998 07:08:16 -0600
To: tacgps@tapr.org
Message-ID: <35126A40.84801D85@amsat.org>
Rendered body type: text/plain

Unfortunately, Ron is sort of out of the Mac business. I had decided about a
year ago that my next platform would not be a Mac, as too much needed software
was not available, and I had to run a "PC Compatible" Mac anyway. But the
decision was accelerated due to a recent lightning strike. The Mac repair
estimate was in excess of $1500 and I put the insurance money into a Dell 300
MHz Pentium II. Besides programming was Phase (N-1) for me.

Robert Winingham wrote:

> ...
> 2. Can we get Ron W5RKN to write a TAC MAC version? :-)
>
> 73
>
> Bob - Dallas,TX --- kc5ejk@onramp.net or kc5ejk@amsat.org ---

--
Ron Parsons
W5RKN

78. RE: [TACGPS:1163] RE: !!! GPS-20 Questions... / Corrupt Almanac

From: Alan Sanders <asand@erols.com>
Date: Fri, 20 Mar 1998 10:16:37 -0500
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <01BD53E9.482C7380@207-172-251-214.s23.as2.loc.erols.com>
Rendered body type: text/plain

What I know so far;... and a few more questions   :-)

The receiver has been on continuously for several days!
Almanac entries for PRN's 11-13,20,26,28,31-32 are all Null's

I have been trying (to no avail) to force the board the dump its current almanac & re-load a new one.
Too bad the battery is spot welded to its holder!
I sent an email off to Garmin, with any luck it will be routed to someone who can speak to this issue.

I have found the published Almanac data but I don't know how to convert it to machine readable format.
If I had that data, I think I could stuff it in.

I think almanacs are only valid for the current week, is this true? Can I count on the unit re-loading an entire data-set in a few days?

79. Re: [TACGPS:1168] RE: !!! GPS-20 Questions... / Corrupt Almanac

From: Gary Sanders <gsanders@gte.net>
Date: Fri, 20 Mar 1998 11:58:00 -0500
To: tacgps@tapr.org
Message-ID: <3512A018.6856BA41@gte.net>
Rendered body type: text/plain

If you talk to Garmin, ask them about two programs that they supplied
to me when I was having problems with my GPS-20's.

One is called GPSCFG.exe, which is a Windows based program used to
(as the program name implies) initially configure the GPS 20/25/30/35.

The other is called NMEAVWR.exe, which is a DOS based program used to
(as the name also implies) view the NMEA data, and send commands to
the board.

I'd make the programs available myself, but I'm not aware of Garmin's
position on distributing these programs.

Garmin tech Support e-mailed them to me when I called them.

I don't know if they will directly support loading of an almanac into the
gps, but I do know they brought mine back from the dead! :-)

Gary Sanders (no relation)

Alan Sanders wrote:
>
> What I know so far;... and a few more questions   :-)
>
> The receiver has been on continuously for several days!
> Almanac entries for PRN's 11-13,20,26,28,31-32 are all Null's
>
> I have been trying (to no avail) to force the board the dump its current almanac & re-load a new one.
  Too bad the battery is spot welded to its holder!
> I sent an email off to Garmin, with any luck it will be routed to someone who can speak to this issue.
>
> I have found the published Almanac data but I don't know how to convert it to machine readable format.
  If I had that data, I think I could stuff it in.
>
> I think almanacs are only valid for the current week, is this true? Can I count on the unit
re-loading an entire data-set in a few days?

80. Re: [TACGPS:1168] RE: !!! GPS-20 Questions... / Corrupt Almanac

From: Robert Winingham <kc5ejk@onramp.net>
Date: Fri, 20 Mar 1998 11:36:09 -0600
To: tacgps@tapr.org
Message-ID: <v03102800b1385891714f@[206.50.200.18]>
Rendered body type: text/plain

>I have been trying (to no avail) to force the board the dump its current almanac & re-load a new one.
Too bad the battery is spot welded to its holder!
>I sent an email off to Garmin, with any luck it will be routed to someone who can speak to this issue.

I know of several MAC programs that will set/load almanac data
Shareware GPSy and MACGPS or the MAC GPS pro version.

or just swap units with someone 500 miles away :-)

I have seem some DOS programs that set the unit.
try Peter Bennett web site - a must vist for all thing GPS.

73

Bob - Dallas,TX --- kc5ejk@onramp.net or kc5ejk@amsat.org ---

81. Ordering TAC32 [was: DGPS REF STA . got it]

From: "Steven R. Bible" <srbible@gate.net>
Date: Fri, 20 Mar 1998 13:15:51 -0500
To: tacgps@tapr.org

Message-ID: <3.0.1.32.19980320131551.0088a2b0@pop.gate.net>
Rendered body type: text/plain

>1. I saw no way to order/pay for the tac32 program on the TAPR
>   web order page.

Sorry about that. We'll get the Web Ordering page update soon.

In the mean time, you can order TAC32 from the TAPR office. Please give Dorothy a phone call at (940) 383-0000. Once you are registered, you will receive the registration password via email. You will also be placed on mailing list so that you receive passwords to new releases.

I hope this helps!

 - Steve, N7HPR
 (n7hpr@tapr.org)

82. Re: GPS-20 Questions... / Corrupt Almanac

From: Dave Martindale <davem@cs.ubc.ca>
Date: Fri, 20 Mar 1998 11:41:28 -0800
To: tacgps@tapr.org
Message-ID: <l03130301b138731c3fe8@[198.162.38.159]>
Rendered body type: text/plain

I've done some almanac experiments with my GPS 20. Below are two almanac dumps, obtained by sending $PGRMO,GPALM,1 to the 20 and capturing the result with a terminal emulator. (For Mac users, note that all GPS 20 commands need to be followed by *both* CR and LF, not just CR).

The first data block is just after turning on my 20, before connecting an antenna, so it's all old data. Note that field 5, the GPS week, is 945 or 946 for all SVs.

The second block of data is after the 20 has been connected to an antenna and navigating for about half an hour. Notice that about half of the entries have change, with the GPS week now being 949 or 950. From this I conclude that the 20 has acquired new almanac data for about half of the SVs. However, it still thinks that 13 is unhealthy.

Now, an entirely new almanac is transmitted every 12.5 minutes, so with no signal dropouts the receiver should be able to completely replace the almanac in that period. The 12XL does seem to be able to do that, or close to it - after half an hour of observing the sky, all of the data in its almanac is new. But the 20 seems much worse, only getting data for half the SVs in 30 minutes. Worse yet, another 1.5 hours of receiving time did not significantly change that number.

So my 20 is acquiring new almanac data, but not very well. I'm going to try leaving it on for most of the day to see what happens.

To Alan: if you read out your 20's almanac, what GPS weeks do you see? Are any of them 949 or 950, or are they all old?

I have confirmed that you *can* load a new almanac into a 20 just by sending the $GPALM strings below. In other words, the data that you get back from the $PGRMO,GPALM,1 command is already exactly in the correct format to send to another 20 to load a new almanac into it. (Again for Mac users: each line has to end with CR-LF).

So you could at least load the lower block of data below into your 20 if this data is more recent than what's in there. But my data is only half-complete at the moment.

Although I do have a fully up-to-date almanac obtained by my 12XL, I do not have any software that will convert the 12XL's almanac format into what the 20 needs. MacGPS Pro will read both formats of almanac and convert both into the human-readable form I included in a message a few days ago. But it will only transfer an almanac from the 20 to the computer, not vice versa.

        Dave

$GPALM,32,1,01,945,00,20F4,90,08C1,FD4F,A10CA0,BC6D56,004046,411DD0,02A,000*72
$GPALM,32,2,02,945,00,8E17,7B,FDDE,FD40,A10CF1,A2369E,52AFFF,8CC315,E20,FFF*09
$GPALM,32,3,03,946,00,1018,0F,057C,FD46,A10CCB,62E581,79B969,C1D941,06B,001*04
$GPALM,32,4,04,945,00,26B6,90,1606,FD3F,A10D2F,DDC8B3,AAA009,ECF6F5,00E,001*0E

```
$GPALM,32,5,05,945,00,095D,7B,FFBF,FD42,A10D5E,F0180E,5362C7,F5B867,090,001*77
$GPALM,32,6,06,946,00,35BE,0F,0A31,FD4C,A10C48,9781F3,7B3002,D0BC23,000,000*7D
$GPALM,32,7,07,946,00,4E01,0F,0BA0,FD4F,A10CCC,A47A2A,79D9F1,21D092,327,000*09
$GPALM,32,8,08,,,,,,,,,,,*4A
$GPALM,32,9,09,945,00,3A96,7B,00D1,FD3D,A10D37,0CFFEB,29A0E1,062EEC,FE0,000*74
$GPALM,32,10,10,946,00,15D2,0F,0F11,FD4B,A10D30,F38620,CF9A8F,59A5EF,014,000*44
$GPALM,32,11,11,,,,,,,,,,,*7A
$GPALM,32,12,12,,,,,,,,,,,*7A
$GPALM,32,13,13,,,,,,,,,,,*7A
$GPALM,32,14,14,946,00,0982,0F,12B0,FD50,A10D0B,7FB194,D16AB7,22CCCA,01C,000*3C
$GPALM,32,15,15,945,00,38BB,90,1963,FD43,A10D21,40537D,AC336F,CDD9A3,228,001*4D
$GPALM,32,16,16,945,00,1627,90,1059,FD53,A10DE6,FFE38E,D69530,C9C029,035,000*45
$GPALM,32,17,17,945,00,4F3B,7B,1A2B,FD4E,A10CBB,6A22D1,ADBFBA,02D732,F4A,000*37
$GPALM,32,18,18,945,00,37DD,7B,01A8,FD42,A10D9D,453869,FDDFF0,59FC71,00C,000*39
$GPALM,32,19,19,,,,,,,,,,,*7A
$GPALM,32,20,20,,,,,,,,,,,*7A
$GPALM,32,21,21,945,00,737B,90,0EA5,FD53,A10D19,8C7DEF,D4C93D,9D0EEA,01A,001*38
$GPALM,32,22,22,946,00,57D4,0F,FDCA,FD3F,A10CBF,0C2127,4E50BC,4A7F4D,032,001*41
$GPALM,32,23,23,945,00,6816,90,10B5,FD55,A10D54,AC0DF4,D6580E,934791,00B,000*4E
$GPALM,32,24,24,946,00,4275,0F,1C71,FD43,A10C64,B5DDD2,A5D923,C22FE4,33D,004*4E
$GPALM,32,25,25,945,00,37ED,7B,FC2F,FD35,A10D2D,963818,284267,3418AB,FF9,000*31
$GPALM,32,26,26,946,00,53D4,0F,0AB9,FD58,A10C89,F4B661,FA8F6E,1890ED,F9A,FFE*37
$GPALM,32,27,27,945,00,677A,7B,FEEE,FD3A,A10C93,7F685C,28FAE1,DC7A91,014,000*36
$GPALM,32,28,28,,,,,,,,,,,*7A
$GPALM,32,29,29,945,00,303C,7B,0869,FD49,A10B07,AEE6CA,FE7804,350208,0DD,00F*4E
$GPALM,32,30,30,946,00,2B4B,0F,048A,FD46,A10C90,404FEE,4F76D1,52B098,FE4,000*45
$GPALM,32,31,31,946,00,41CD,0F,0B43,FD4E,A10DCF,1D79E3,79E9D6,EB2BAD,002,000*4F
$GPALM,32,32,32,,,,,,,,,,,*7A

$GPALM,32,1,01,949,00,21D9,90,08A8,FD4E,A10CB6,BC8CD9,EBD43B,6A24B0,02D,000*08
$GPALM,32,2,02,950,00,8EFC,0F,FDB5,FD35,A10CE9,A26900,394372,7AD0A0,E16,FFF*75
$GPALM,32,3,03,,,,,,,,,,,*4A
$GPALM,32,4,04,950,00,26A5,0F,164C,FD42,A10D54,DEDFAF,9147C1,DA8419,013,001*7E
$GPALM,32,5,05,950,00,092E,0F,FF94,FD38,A10D2C,F160D0,39F71D,E24D04,095,000*0B
$GPALM,32,6,06,946,00,35BE,0F,0A31,FD4C,A10C48,9781F3,7B3002,D0BC23,000,000*7D
$GPALM,32,7,07,946,00,4E01,0F,0BA0,FD4F,A10CCC,A47A2A,79D9F1,21D092,327,000*09
$GPALM,32,8,08,949,00,5386,90,0A51,FD49,A10CA9,49DBAA,1694E2,D908AA,286,004*75
$GPALM,32,9,09,950,00,3B20,0F,010E,FD37,A10D2A,0D23C6,103ADB,F3E84C,FDC,000*0D
$GPALM,32,10,10,946,00,15D2,0F,0F11,FD4B,A10D30,F38620,CF9A8F,59A5EF,014,000*44
$GPALM,32,11,11,,,,,,,,,,,*7A
$GPALM,32,12,12,,,,,,,,,,,*7A
$GPALM,32,13,13,,,,,,,,,,,*7A
$GPALM,32,14,14,946,00,0982,0F,12B0,FD50,A10D0B,7FB194,D16AB7,22CCCA,01C,000*3C
$GPALM,32,15,15,950,00,3957,0F,19AE,FD46,A10D12,3FDE82,92DC62,BD1D52,233,001*32
$GPALM,32,16,16,950,00,1744,0F,106A,FD48,A10DBC,006EF1,BD3770,B753B9,039,000*48
$GPALM,32,17,17,950,00,4FC4,0F,1A78,FD48,A10CB3,6A68E7,9461D0,F0FCED,F47,000*44
$GPALM,32,18,18,949,00,375B,90,0190,FD44,A10D7F,4561AA,E968EB,8131F6,00D,000*37
$GPALM,32,19,19,,,,,,,,,,,*7A
$GPALM,32,20,20,,,,,,,,,,,*7A
$GPALM,32,21,21,950,00,7385,0F,0EBA,FD46,A10D10,8CF7D9,BB6AAD,8B7FE9,01F,001*4E
$GPALM,32,22,22,946,00,57D4,0F,FDCA,FD3F,A10CBF,0C2127,4E50BC,4A7F4D,032,001*41
$GPALM,32,23,23,949,00,6871,90,10C4,FD51,A10D5B,AC769E,C1E900,BB64E2,00C,000*3B
$GPALM,32,24,24,946,00,4275,0F,1C71,FD43,A10C64,B5DDD2,A5D923,C22FE4,33D,004*4E
$GPALM,32,25,25,950,00,38CA,0F,FC6A,FD31,A10D5A,972C1A,0EDA72,20EC5E,FF9,000*3C
$GPALM,32,26,26,946,00,53D4,0F,0AB9,FD58,A10C89,F4B661,FA8F6E,1890ED,F9A,FFE*37
$GPALM,32,27,27,950,00,6834,0F,FF2C,FD38,A10C7C,804795,0F9420,CA35A5,017,000*3E
$GPALM,32,28,28,,,,,,,,,,,*7A
$GPALM,32,29,29,950,00,3158,0F,0853,FD52,A10B17,AF36BD,E515D9,24FA58,15D,00B*33
$GPALM,32,30,30,946,00,2B4B,0F,048A,FD46,A10C90,404FEE,4F76D1,52B098,FE4,000*45
$GPALM,32,31,31,946,00,41CD,0F,0B43,FD4E,A10DCF,1D79E3,79E9D6,EB2BAD,002,000*4F
$GPALM,32,32,32,,,,,,,,,,,*7A
```

83. NOTICE ADVISORY TO NAVSTAR USERS (NANU) 1998037

```
From: "Steven R. Bible" <srbible@gate.net>
Date: Fri, 20 Mar 1998 15:06:30 -0500
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19980320150630.0089ede0@pop.gate.net>
Rendered body type: text/plain
```

```
NOTICE ADVISORY TO NAVSTAR USERS (NANU) 1998037
SUBJ: SVN33 (PRN03) FORECAST OUTAGE JDAY 090/1250 - JDAY 091/0050
1.     NANU TYPE: FCSTMX
       NANU NUMBER: 1998037
       NANU DTG: 172030Z MAR 1998
       REFERENCE NANU: N/A
       REF NANU DTG: N/A
       SVN: 33
       PRN: 03
       START JDAY: 090
```

START TIME ZULU: 1250
START CALENDAR DATE: 31 MAR 1998
STOP JDAY: 091
STOP TIME ZULU: 0050
STOP CALENDAR DATE: 01 APR 1998

2. CONDITION: GPS SATELLITE SVN33 (PRN03) WILL BE UNUSABLE ON JDAY 090 (31 MAR 1998) BEGINNING 1250 ZULU UNTIL JDAY 091 (01 APR 1998) ENDING 0050 ZULU.

3. POC: CIVILIAN - NAVCEN AT (703)313-5900, HTTP://WWW.NAVCEN.USCG.MIL MILITARY - LT BRIAN BARKER, 2 SOPS NAVIGATION ANALYST, DSN 560-6378, COMM 719-567-6378, GPS@FAFB.AF.MIL, HTTP://WWW.FAFB.AF.MIL/GPS

84. Re: [TACGPS:1170] RE: !!! GPS-20 Questions... / Corrupt Almanac

From: Dave Martindale <davem@cs.ubc.ca>
Date: Fri, 20 Mar 1998 12:11:13 -0800
To: tacgps@tapr.org
Message-ID: <l03130303b1387b4f2cf5@[198.162.38.159]>
Rendered body type: text/plain

>I know of several MAC programs that will set/load almanac data
>Shareware GPSy and MACGPS or the MAC GPS pro version.

GPSy will read and write almanac data only for the handheld Garmins, using the Garmin binary protocol. It won't do the transfer either way for the GPS 20, which uses NMEA for that.

MacGPS Pro *will* read an almanac from a 20 and convert it to human-readable format. It just won't do the transfer in the opposite direction.

(I have sent email to the authors of both programs suggesting that being able to load an almanac into a 20 would be useful).

You *can* transfer an almanac from one 20 to another using a plain terminal emulator program. Start with the 20 with the "good" almanac. Set the terminal program to capture the data stream to a file. Send the command $PGRMO,GPALM,1<CR><LF> to the GPS 20. It will send back 32 almanac records.

Then stop capturing data, and edit the capture file in a text editor. delete everything except the 32 $GPALM almanac records. Write them back out. Now connect the GPS 20 with the "bad" almanac to the computer, and use the terminal emulator to send it the file of 32 almanac records obtained from the good 20. That's it. Now the second 20 has the same almanac as the first one.

This works because the data format that the 20 outputs an almanac in is exactly the set of commands that you need to send to it to make it load new almanac data. No reformatting is needed.

Note that this process works equally well when the two GPS 20s are on opposite sides of the world and the data file is emailed.

Now, if only I could get my 20 to load a complete, up-to-date almanac, I'd mail it to Alan.

Is there anyone who has a GPS 25 who is willing to get a current almanac (it should only take a half hour on that receiver) and mail it to we poor slobs with 20s?

Dave

85. NOTICE ADVISORY TO NAVSTAR USERS (NANU) 1998038

From: "Steven R. Bible" <srbible@gate.net>
Date: Fri, 20 Mar 1998 15:12:34 -0500
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19980320151234.007ae460@pop.gate.net>
Rendered body type: text/plain

NOTICE ADVISORY TO NAVSTAR USERS (NANU) 1998038
SUBJ: SVN26 (PRN26) FORECAST OUTAGE CANCELLED
1. NANU TYPE: FCSTCANC
NANU NUMBER: 1998038
NANU DTG: 181520Z MAR 1998
REFERENCE NANU: 1998034
REF NANU DTG: 132215Z MAR 1998
SVN: 26
PRN: 26

START JDAY: 083
START TIME ZULU: 1400
START CALENDAR DATE: 24 MAR 1998
STOP JDAY: CANCELLED
STOP TIME ZULU: N/A
STOP CALENDAR DATE: N/A

2. CONDITION: THE FORECAST OUTAGE FOR GPS SATELLITE SVN26 (PRN26) SCHEDULED FOR
JDAY 083(24 MAR 1998) BEGINNING 1400 ZULU HAS BEEN CANCELLED.

3. POC: CIVILIAN - NAVCEN AT (703)313-5900, HTTP://WWW.NAVCEN.USCG.MIL
MILITARY - LT BRIAN BARKER, 2 SOPS NAVIGATION ANALYST, DSN 560-6378,
COMM 719-567-6378, GPS@FAFB.AF.MIL, HTTP://WWW.FAFB.AF.MIL/GPS

---1998039-----------------------
NOTICE ADVISORY TO NAVSTAR USERS (NANU) 1998039
SUBJ: SVN22 (PRN22) FORECAST OUTAGE JDAY 083/1400 - JDAY 084/0200
1. NANU TYPE: FCSTMX
NANU NUMBER: 1998039
NANU DTG: 181530Z MAR 1998
REFERENCE NANU: N/A
REF NANU DTG: N/A
SVN: 22
PRN: 22
START JDAY: 083
START TIME ZULU: 1400
START CALENDAR DATE: 24 MAR 1998
STOP JDAY: 084
STOP TIME ZULU: 0200
STOP CALENDAR DATE: 25 MAR 1998

2. CONDITION: GPS SATELLITE SVN22 (PRN22) WILL BE UNUSABLE ON JDAY 083
(24 MAR 1998) BEGINNING 1400 ZULU UNTIL JDAY 084 (25 MAR 1998) ENDING 0200 ZULU.

3. POC: CIVILIAN - NAVCEN AT (703)313-5900, HTTP://WWW.NAVCEN.USCG.MIL
MILITARY - LT BRIAN BARKER, 2 SOPS NAVIGATION ANALYST, DSN 560-6378,
COMM 719-567-6378, GPS@FAFB.AF.MIL, HTTP://WWW.FAFB.AF.MIL/GPS

86. DGPS REF STA , it's works !

From: Robert Winingham <kc5ejk@onramp.net>
Date: Fri, 20 Mar 1998 17:22:47 -0600
To: tacgps@tapr.org
Message-ID: <v03102800b138a7369282@[206.50.200.66]>
Rendered body type: text/plain

My Garmin-45 XL GPS now has something DIF ferent in the bar graph/sat view.

I now have a D in some of the bars !!

I loaded data with the Motorola DOS program.

I think I will work my DGPS location backwards and place the remote
GPS on the Geo marker down the street and tweek the DGPS unit via
software.

Good kit , thanks

73

Bob - Dallas,TX --- kc5ejk@onramp.net or kc5ejk@amsat.org ---

87. Offline DGPS with Oncore?

From: Luca Bertagnolio <berta@micronet.it>
Date: Sat, 21 Mar 1998 23:43:44 +0100
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980321234344.01768c10@micronet.it>
Rendered body type: text/plain

Hello,

has anyone here (Tom? Steve? Rick?) ever thought of using the DGPS base
station to produce correction files which can be used to match the similar
data captured by the rover GPS receiver in order to achieve offline DGPS?

I have been doing this in the early 90's with a Trimble PathFinder and a
4000SE, and it's really interesting to plot the uncorrected data vs. the

corrected one.

This could be a very easy way to produce precise waypoints in order to
import maps in a software like Fugawi (http://www.fugawi.com).

73 de Luca IK2OVV

88. TNC & Radio for DGPS

From: Brooke Clarke <brooke@pacific.net>
Date: Sat, 21 Mar 1998 18:29:56 -0800
To: tacgps@tapr.org
Message-ID: <351477A4.8E6@pacific.net>
Rendered body type: text/plain

I have the DGPS Ref. Sation Interface board on order.

I would like to use my two Motorola Encore GPS receivers as:
(1) a base station
(2) a remote station
and also be able to use Garmin hand held receivers as remotes.

OPTION #1
Can I use the MFJ-8621 Transceiver for 9600 baud for both of
the above stations? What is a good 9600 TNC to go with these?

OPTON #2
Use my existing 2m equipment and send the
correction data at 1200 baud. If I do this are there TNC units
that will receive data at 1200 and output data at 9600 to the
remote GPS receiver?

Thanks,

Brooke Clarke
N6GCE
********** remove NOSPAM to reply ***********

89. Re: [TACGPS:1178] TNC & Radio for DGPS

From: "Doug McKinney" <buoy@redshift.com>
Date: Sat, 21 Mar 1998 21:15:55 -0800
To: <tacgps@tapr.org>
Message-ID: <002501bd5555$20a35c80$8dc6cccf@buoy.mcktech.com>
Rendered body type: text/plain

-----Original Message-----
From: Brooke Clarke <brooke@pacific.net>
To: tacgps@tapr.org <tacgps@tapr.org>
Date: Saturday, March 21, 1998 6:40 PM
Subject: [TACGPS:1178] TNC & Radio for DGPS

>I have the DGPS Ref. Sation Interface board on order.
>
>I would like to use my two Motorola Encore GPS receivers as:
>(1) a base station
>(2) a remote station
>and also be able to use Garmin hand held receivers as remotes.
>
>OPTION #1
>Can I use the MFJ-8621 Transceiver for 9600 baud for both of
>the above stations? What is a good 9600 TNC to go with these?

First question is yes, second question is I'll see what others are currently
using for 9600. I use several older models of 9600 (PacComm with add on
9600 board, DRSI DPK-9600 and RF NEULINK modem radios).

>
>OPTON #2
>Use my existing 2m equipment and send the
>correction data at 1200 baud. If I do this are there TNC units
>that will receive data at 1200 and output data at 9600 to the
>remote GPS receiver?

That's the nice part about using TNCs is that they have a radio baud rate
that is independent to the termial baud rate. This means that the radio
baud rate is fixed at 1200 but the terminal baud rate can be anything else,
therefore, your received data (at radio end is 1200 baud) can be sent to
your GPS (terminal baud rate end) at 9600 or any other rate like 4800.

>
>Thanks,
>
>Brooke Clarke
>N6GCE
>********** remove NOSPAM to reply **********
>

90. GPS-20 almanac problems

From: Dave Martindale <davem@cs.ubc.ca>
Date: Sun, 22 Mar 1998 10:19:07 -0800
To: tacgps@tapr.org
Message-ID: <l03130300b13b02a85d77@[198.162.38.159]>
Rendered body type: text/plain

My GPS-20 has been on for almost 48 hours continously now. Its current almanac is below. The data for all SV's except 18 has been updated to the current week (950 in field 5). However, if you look at the almanc reference time (field 8), they are still from a bunch of different times in week 950. A 12XL, given half an hour to look at the sky, will acquire an almanac with all entries having the same reference time, showing that all the entries are new. The GPS 20 almanac entries were acquired at different times over the last 2 days; most of them are not the most recent.

So, it seems that my GPS 20 takes about 2 days of operation to get a reasonably current almanac, while the 12XL (and probably GPS 25) can do it in under half an hour.

There's a more serious problem. Even after 2 days, the 20's almanac marks 8 SV's as unusable. The 12XL's almanac shows only 5 (11, 12, 20, 28, 32). The other three (3, 13, 19) are in fact healthy, but the GPS 20 has not updated its almanac entries for those SVs.

Now, 13 and 19 were unusable in the almanac present in the 20 when I started this test two days ago. It seems unlikely that the 20 has not received any valid data for these two SVs in 2 days, when it has updated all other almanac entries. SV 3 is even stranger; its almanac entry was valid 2 days ago, but now it's marked as unusable even though it is in fact healthy.

This suggests there is some sort of bug in the 20's almanac handling that causes it to "lose" SVs, marking them unusable, and that once they are in this state they remain there forever.

Unfortunately, I don't see any way of telling the 20 to discard its current almanac and acquire a new one. Removing the backup battery is difficult because it's soldered on.

Dave

```
$GPALM,32,1,01,950,00,21EB,24,08AB,FD55,A10CC5,BC8B6B,E6DE9E,2F7800,02D,000*04
$GPALM,32,2,02,950,00,8F06,24,FDB1,FD2B,A10CE1,A269D4,393BDF,79FDD6,E15,FFF*70
$GPALM,32,3,03,,,,,,,,,,,,*4A
$GPALM,32,4,04,950,00,26A5,0F,164C,FD42,A10D54,DEDFAF,9147C1,DA8419,013,001*7E
$GPALM,32,5,05,950,00,092E,0F,FF94,FD38,A10D2C,F160D0,39F71D,E24D04,095,000*0B
$GPALM,32,6,06,950,00,35B5,24,09DE,FD4F,A10C27,976DB0,66BB2E,F9B1F4,000,000*78
$GPALM,32,7,07,950,00,4E46,24,0B47,FD52,A10CEB,A48504,6565B5,49F60C,32A,000*06
$GPALM,32,8,08,950,00,536A,39,0A59,FD48,A10CB0,49E903,1197B8,9D7EA9,28A,004*01
$GPALM,32,9,09,950,00,3B1F,24,0111,FD37,A10D2C,0D23A4,103361,F313D2,FDC,000*72
$GPALM,32,10,10,950,00,16AF,24,0F26,FD39,A10D45,F41F5A,BB2320,80D7E1,015,000*46
$GPALM,32,11,11,,,,,,,,,,,,*7A
$GPALM,32,12,12,,,,,,,,,,,,*7A
$GPALM,32,13,13,,,,,,,,,,,,*7A
$GPALM,32,14,14,950,00,0892,39,12BF,FD35,A10CC7,7F7BF4,BCEDC1,4A4EF9,01D,000*31
$GPALM,32,15,15,950,00,3957,0F,19AE,FD46,A10D12,3FDE82,92DC62,BD1D52,233,001*32
$GPALM,32,16,16,950,00,1758,39,1067,FD32,A10DAD,008236,BD28AC,B58D07,039,000*42
$GPALM,32,17,17,950,00,4FC9,24,1A7B,FD47,A10CB2,6A699C,945A8F,F02C13,F47,000*4A
$GPALM,32,18,18,949,00,375B,90,0190,FD44,A10D7F,4561AA,E968EB,8131F6,00D,000*37
$GPALM,32,19,19,,,,,,,,,,,,*7A
$GPALM,32,20,20,,,,,,,,,,,,*7A
$GPALM,32,21,21,950,00,7385,0F,0EBA,FD46,A10D10,8CF7D9,BB6AAD,8B7FE9,01F,001*4E
$GPALM,32,22,22,950,00,57FF,39,FD9E,FD21,A10CD6,0CA2AC,39CAC8,71669D,038,001*40
$GPALM,32,23,23,950,00,6875,24,10C3,FD40,A10D54,AC7CC0,BCF33E,80A5B5,00C,000*41
$GPALM,32,24,24,950,00,420C,39,1CBE,FD50,A10C86,B61C76,9163E2,E9B15B,35C,002*34
$GPALM,32,25,25,950,00,38D7,24,FC6D,FD31,A10D5E,973323,0ED2E7,200EEB,FF9,000*3C
$GPALM,32,26,26,950,00,5490,24,0A9D,FD58,A10CA7,F50E33,E61CB3,40B04C,F6A,00F*3E
$GPALM,32,27,27,950,00,6834,0F,FF2C,FD38,A10C7C,804795,0F9420,CA35A5,017,000*3E
$GPALM,32,28,28,,,,,,,,,,,,*7A
```

```
$GPALM,32,29,29,950,00,3158,0F,0853,FD52,A10B17,AF36BD,E515D9,24FA58,15D,00B*33
$GPALM,32,30,30,950,00,2B6A,24,0460,FD37,A10C6D,409004,3AFBBF,7AFF8F,FE0,000*42
$GPALM,32,31,31,950,00,4257,39,0AE7,FD55,A10C22,1DAB59,656DF8,12596D,003,000*41
$GPALM,32,32,32,,,,,,,,,,,,*7A
```

91. RE: [TACGPS:1169] RE: !!! GPS-20 Alive & Well

From: Alan Sanders <asand@erols.com>
Date: Sun, 22 Mar 1998 16:33:27 -0500
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <01BD55B1.69381F60@207-172-164-84.s21.as5.loc.erols.com>
Rendered body type: text/plain

Many thanks to those who contributed their experience, especially Mr. Martindale for including some data in one of his posts.

Once some fresh almanac data had been loaded, the unit began to behave much, much better. It is now happily providing solutions & updating the almanac on it's own, albeit slowly. I suppose its just the logic behind the early generation GPS-20 that produces the behavior I find curious. And some of the ALM sentences are still Null's. I don't know what it takes to freshen the entire table, but I'll ignore that since the sensor is now behaving. Besides, the sample data form Mr. Martindale showed similar entries. I guess it time to step up to a parallel receiver. :-)

Thanks all....

PS: thanks also to Bill Stone at Garmin who sent me the GPSCFG utility they use. hope I never need it!

92. Re: [TACGPS:1178] TNC & Radio for DGPS

From: "Steven R. Bible" <srbible@gate.net>
Date: Sun, 22 Mar 1998 18:57:19 -0500
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19980322185719.00817100@pop.gate.net>
Rendered body type: text/plain

At 08:36 PM 3/21/98 -0600, you wrote:
>I have the DGPS Ref. Sation Interface board on order.
>
>I would like to use my two Motorola Encore GPS receivers as:
>(1) a base station
>(2) a remote station
>and also be able to use Garmin hand held receivers as remotes.
>
>OPTION #1
>Can I use the MFJ-8621 Transceiver for 9600 baud for both of
>the above stations? What is a good 9600 TNC to go with these?

Here are a few 9600 baud modems that I know about.
- MFJ-9600 - attaches to MFJ-1270 TNCs and TNC-2 clones
- Kantronics KPS-9612 - has both 9600 and 1200 baud modems
- AEA PK-96 - Timewave is the new owner of AEA data products
- TAPR 9600 modem - attaches to TNC-2 and clones TNCs

>OPTON #2
>Use my existing 2m equipment and send the
>correction data at 1200 baud. If I do this are there TNC units
>that will receive data at 1200 and output data at 9600 to the
>remote GPS receiver?

As Doug mentioned, the data rate to the computer can be set different than the radio data rate. Be careful that the GPS receiver can handle the data rate you choose. I know that my Garmin 45's RTCM input is selectable from 1200 to 9600 baud.

- Steve, N7HPR
(n7hpr@tapr.org)

93. DGPS REF STA vs. US COAST GUARD

From: Boyd Prestwood <w2hob@mosquito.com>
Date: Sun, 22 Mar 1998 22:36:30 -0500
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19980322223630.006e5da0@mail.mosquito.com>
Rendered body type: text/plain

I asked this to the SIG but no one replied... now... I'm hoping maybe I
could get a direct reply from Tom Clark, W3IWI, or Steve Bible, N7HPR...

I've ordered and am awaiting delivery of the DGPS Ref Sta board. I will
mate it to an Oncore here. My question is how accurate are the corrections
it will transmit compared to the corrections transmitted from one of those
US Coast Guard DGPS stations on 200-300 KHz. I would lile to know this not
only for myself but I would like to brag a little to the other APRS GPS
mobilers here in SNJ how much better their beaconed positions will be when
they hook up the other wire in their data cable!

Thanks so much for taking the time for me.
73 de Boyd Prestwood, W2HOB
w2hob@mosquito.com

94. Active Antenna

From: "Bittle, James F" <James.Bittle@MSRC.WPAFB.AF.MIL>
Date: Mon, 23 Mar 1998 07:09:44 -0500
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <ADCC38EE0118D011BFFB0000F801266303BD58F1@asent45.wpafb.af.mil>
Rendered body type: text/plain

Well, I got one of those nice antennas from Lowes for my GPS20 and then
inadvertently applied 13 volts to it. Does anyone know the internals
well enough to know if its been fried? Although it draws about 70 ma, it
doesn't appear to work any better than a passive antenna.

Thanks,
Jim, W8MYV

95. DGPS receiver source

From: Kohjin Yamada <kohjin@cosmos.marina.prug.or.jp>
Date: Mon, 23 Mar 1998 21:04:59 +0900
To: tacgps@tapr.org
Message-ID: <199803231205.VAA14857@cosmos.marina.prug.or.jp>
Rendered body type: text/plain

Dear all,

Does anyone know of the source for DGPS receiver?
Any suggestion for good brand/price, Garmin or else etc?
I was told a DGPS costal station near my qth transmitting 304KHz or some.
Would like to buy one and hook it to my TAC32/Motorola Oncore PVT6 with
a TAPR new DGPS kit.

WEB URL info's would be appreciated if possible.
Thank you, Kohjin JR1EDE

96. Re: [TACGPS:1184] Active Antenna

From: Garwood745 <Garwood745@aol.com>
Date: Mon, 23 Mar 1998 09:33:28 EST
To: tacgps@tapr.org
Message-ID: <9819dd37.351672bc@aol.com>
Rendered body type: text/plain

i think that it operates on +5vdc.

gary

97. RE:DGPS receiver source

From: □□□□□ <SDI00848@niftyserve.or.jp>
Date: Tue, 24 Mar 1998 00:46:00 +0900
To: tacgps@tapr.org
Message-ID: <199803231548.AAA05706@ms7.niftyserve.or.jp>
Rendered body type: text/plain

Hello Kohjin san.

>>Does anyone know of the source for DGPS receiver?
>>Any suggestion for good brand/price, Garmin or else etc?
>>I was told a DGPS costal station near my qth transmitting 304KHz or some.
>>Would like to buy one and hook it to my TAC32/Motorola Oncore PVT6 with
>>a TAPR new DGPS kit.

  Garmin GBR21
  Magellan DBR
  Eagle DBR

  These are about $500. I'm using GBR21 with GPS12XL.
  The DGPS station near Yamada is TSURUGISAKI station at 309kHz.
I am receiving DGPS beacon in here Hadano-shi, very well.
The application of DGPS station expands from April 1 in Japan.

  Hitoshi Kuwano,JM1OMH

98. Re: [TACGPS:1184] Active Antenna

From: Dave Martindale <davem@cs.ubc.ca>
Date: Mon, 23 Mar 1998 07:54:06 -0800
To: tacgps@tapr.org
Message-ID: <l03130300b13c35a24897@[198.162.38.159]>
Rendered body type: text/plain

>Well, I got one of those nice antennas from Lowes for my GPS20 and then
>inadvertently applied 13 volts to it. Does anyone know the internals
>well enough to know if its been fried? Although it draws about 70 ma, it
>doesn't appear to work any better than a passive antenna.

When working properly, it should draw about 20-25 mA from 5 V, and it
provides considerably stronger signals than your average passive antenna.
It sounds like yours was damaged. Sorry.

        Dave

99. Re: [TACGPS:1187] RE:DGPS receiver source

From: Kohjin Yamada <kohjin@cosmos.marina.prug.or.jp>
Date: Tue, 24 Mar 1998 03:39:53 +0900
To: tacgps@tapr.org
Message-ID: <199803231840.DAA15221@cosmos.marina.prug.or.jp>
Rendered body type: text/plain

Hi Kuwano-san,

Surprised to have the response from you!
So, what are their web page?

Thanks for the information.
Keep your good job in GPS world!
73 Kohjin

At 09:51 98/03/23 -0600, you wrote:
>
> Hello Kohjin san.
>
> >>Does anyone know of the source for DGPS receiver?
> >>Any suggestion for good brand/price, Garmin or else etc?
> >>I was told a DGPS costal station near my qth transmitting 304KHz or some.
> >>Would like to buy one and hook it to my TAC32/Motorola Oncore PVT6 with
> >>a TAPR new DGPS kit.
>
>   Garmin GBR21
>   Magellan DBR
>   Eagle DBR
>
>   These are about $500. I'm using GBR21 with GPS12XL.
>   The DGPS station near Yamada is TSURUGISAKI station at 309kHz.
> I am receiving DGPS beacon in here Hadano-shi, very well.
> The application of DGPS station expands from April 1 in Japan.
>
>   Hitoshi Kuwano,JM1OMH
>
>
>

100. Re: [TACGPS:1185] DGPS receiver source

From: TomR736570 <TomR736570@aol.com>
Date: Mon, 23 Mar 1998 14:18:17 EST
To: tacgps@tapr.org
Message-ID: <4b9870f4.3516b57b@aol.com>
Rendered body type: text/plain

DGPS receivers are mostly a marine item. The bigger boating supply places
carry them. The 1998 Shoreway Marine catalog (www.shorewaymarine.com) has the
Garmin GRB 21 diff. beacon receiver for $449. Some of their GPS units include
diff. for an extra $300 to $600. Also, I'm told you may need a fairly
substantial antenna, not suitable for hand held or vehicle portable use.
I looked at this stuff briefly last year and decided to wait for the TAPR kit

to be developed and get debugged buy people that have more electronics skill
than I have. That time is about here.
Good luck, Tom Richardson, KA1WZU

101. Re: [TACGPS:1186] Re: Active Antenna

From: Gary Mastenbrook-G13216 <Gary_Mastenbrook-G13216@email.mot.com>
Date: Mon, 23 Mar 1998 11:28:00 -0600
To: tacgps@tapr.org
Message-ID: <M6550824.012.a9alf.1.980323174517Z.CC-MAIL*/OU=XNBCC/OU=ILBA/PRMD=MOT/ADMD=MOT/C=US/@MHS>
Rendered body type: text/plain

Message authorized by:
    : Garwood745@aol.com@INTERNET at #EMAIL

     If you're drawing 70 mA at +5 VDC (after putting +12V on it) and have
     a large reduction in gain now, it is likely that you've damaged the RF
     amplifier IC in the antenna module. The bias circuitry is likely to
     be OK. The Motorola GPS antenna preamplifiers that I've seen have used
     an 8 pin SOIC which is not rated for +12 VDC operation. They usually
     draw around 20 mA when supplied with the nominal +5 VDC supply.

     I have some 'spare' GPS antennas which had a mechanical failure (case
     & RF connector) from which I could remove an amplifier chip for you.
     Can you supply a part number for the RF IC in your antenna module?
     (I'll try to look up the RF IC part number for the Motorola version so
     we can compare it with yours after you've opened your antenna...)

     Regards,

     Gary Mastenbrook N8DMT
     Chicago, IL

_____ Reply Separator _____
Subject: [TACGPS:1186] Re: Active Antenna
Author: tacgps@tapr.org@INTERNET at #EMAIL
Date: 3/23/98 8:35 AM

i think that it operates on +5vdc.

gary

102. Re: [TACGPS:1183] DGPS REF STA vs. US COAST GUARD

From: "Steven R. Bible" <srbible@gate.net>
Date: Tue, 24 Mar 1998 17:50:38 -0500
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19980324175038.008224e0@pop.gate.net>
Rendered body type: text/plain

At 09:39 PM 3/22/98 -0600, you wrote:
>I asked this to the SIG but no one replied... now... I'm hoping maybe I
>could get a direct reply from Tom Clark, W3IWI, or Steve Bible, N7HPR...
>
>I've ordered and am awaiting delivery of the DGPS Ref Sta board. I will
>mate it to an Oncore here. My question is how accurate are the corrections
>it will transmit compared to the corrections transmitted from one of those
>US Coast Guard DGPS stations on 200-300 KHz. I would lile to know this not
>only for myself but I would like to brag a little to the other APRS GPS
>mobilers here in SNJ how much better their beaconed positions will be when
>they hook up the other wire in their data cable!

Sorry for the delay Boyd, it's been a little busy around the farm :-).

To answer your question we have to look at the scatter plots that I made.
You can view these at

    http://www.tapr.org/gps/dgps/

Scroll down to the Performance links. The before and after plots I did for
the Garmin 45, Garmin GPS-20, and Motorola Oncore VP show the following:

Receiver	95th Percentile w/o Diff	w/ Diff (in meters)
Garmin 45	64	16
Garmin GPS-20	59	15
Motorola Oncore VP	58	11

Note: The correction rate was set at 10 seconds per message.

These were taken while transmitting the corrections over two meters. The receivers were held stationary to record the data. The antenna of the Reference Station and the remote were different.

Then Tom W3IWI lent me a L-Band splitter to conduct Zero Baseline test. These test couple the Reference Station and the Remote Station on the same antenna. This rules out the antenna and multipath. You can view these plots at

     http://www.tapr.org/gps/dgps/zerobase.html

Now we get

Receive	95th Percentile Zero Baseline (in meters)	
Garmin 45	14	@ 1 second rate
Garmin GPS-20	18	@ 1 second rate
Motorola Oncore VP	3	@ 1 second rate

To see a scatter plot of USCG Differential, go to

    http://satnav.atc.ll.mit.edu/gps/images/cg_dgps.gif

This particular plot was taken 19 March and shows the 95th Percentile as 2.8 meters.

The explaination for the difference of 2.8 meters (USCG) verses the TAPR DGPS RefSta is the local oscillator in the Motorola Oncore VP used in the Reference Station. Commercial Reference Station that cost several thousands of dollars more than the TAPR RefSta have a much more stable and accurate local oscillator. But as you can surmize, the TAPR unit has a great cost/performance ratio depending on the application. The TAPR unit is still several orders of magnitude better than without.

 - Steve, N7HPR
 (n7hpr@tapr.org)

103. Re: [TACGPS:1183] DGPS REF STA vs. US COAST GUARD

From: Phil Reed <pcr@ic.net>
Date: Tue, 24 Mar 1998 19:30:24 -0500
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19980324193024.0325de14@ic.net>
Rendered body type: text/plain

At 09:39 PM 3/22/98 -0600, you wrote:
>I asked this to the SIG but no one replied... now... I'm hoping maybe I
>could get a direct reply from Tom Clark, W3IWI, or Steve Bible, N7HPR...
>
>I've ordered and am awaiting delivery of the DGPS Ref Sta board. I will
>mate it to an Oncore here. My question is how accurate are the corrections
>it will transmit compared to the corrections transmitted from one of those
>US Coast Guard DGPS stations on 200-300 KHz. I would lile to know this not
>only for myself but I would like to brag a little to the other APRS GPS
>mobilers here in SNJ how much better their beaconed positions will be when
>they hook up the other wire in their data cable!

Let's see... Working from first principles, we get the following possible sources of degraded accuracy:

(1) You need to know the position of the antenna feeding your DGPS generator very precisely. Obviously, any inaccuracy in the location of your antenna will translate to the same inaccuracy in the transmitted correction factor. What's the standard accuracy of a DGPS position? 3-5 meters? I suspect you'd want your location error to be at least that small, and probably better.

(2) Precision of your received & processed signal - probably no worse than what the Coast Guard has. No doubt, they use much higher quality receivers, but I don't know how that would translate into a correction.

(3) Frequency of your DGPS transmission. How often does the Coast Guard transmit a correction? If you transmit less often, then SA will build up a little

more between transmissions.

Does this help any?

...phil

104. Re: [TACGPS:1192] Re: DGPS REF STA vs. US COAST GUARD

From: Boyd Prestwood <w2hob@mosquito.com>
Date: Tue, 24 Mar 1998 23:02:47 -0500
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19980324230247.006c3810@mail.mosquito.com>
Rendered body type: text/plain

At 05:43 PM 3/24/98 -0600, you wrote:

>Sorry for the delay Boyd, it's been a little busy around the farm :-).

W2HOB: No problem, Steve. Thanks for your reply. I figured you gfuys were busy or else Tom was in some far off land!

>To answer your question we have to look at the scatter plots that I made.
>You can view these at
>
>   http://www.tapr.org/gps/dgps/

W2HOB: Yes, I did this while making up my mind to purshace the board!

>To see a scatter plot of USCG Differential, go to
>
>   http://satnav.atc.ll.mit.edu/gps/images/cg_dgps.gif
>
>This particular plot was taken 19 March and shows the 95th Percentile as
>2.8 meters.

W2HOB: This I have not done but will. Thanks for the URL.

>The explaination for the difference of 2.8 meters (USCG) verses the TAPR
>DGPS RefSta is the local oscillator in the Motorola Oncore VP used in the
>Reference Station. Commercial Reference Station that cost several
>thousands of dollars more than the TAPR RefSta have a much more stable and
>accurate local oscillator. But as you can surmize, the TAPR unit has a
>great cost/performance ratio depending on the application. The TAPR unit
>is still several orders of magnitude better than without.

W2HOB: I figured that the TAPR project was almost as good, especially for ham purposes and you can't beat the cost factor. I'm still eager to pursue this and am still waiting on the board's arrival... guess Dorothy will send out some orders soon... I know she has her hands full most of the time.

I let TAC32 run for 44 hours and used the average for my precision position. It hadn't changed for several hours so I stopped it at 44 hrs... I assume that's about as good as I'm gonna get it, eh?

Thanks again for your time to reply. It was much appreciated.

73 de Boyd W2HOB New Jersey

105. RE: DGPS REF STA vs. US COAST GUARD

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Wed, 25 Mar 1998 07:12:26 -0500
To: <tacgps@tapr.org>
Message-ID: <199803251211.HAA25131@gw.cnssys.com>
Rendered body type: text/plain

Boyd,

A single average should be within 5 meters, or so.

If you want the best reference location for your DGPS station, run TAC32 in the averaging mode a few times for periods of 24 hours or longer. Write down each result and manually average the results. This will give you a better result than a single average. Should be within a meter or two.

A better way to do this is to collect RINEX data and post-process with a standard reference station. We do not have RINEX working in TAC32 yet, however and the post-processing software costs $300-$1,500. This should get you to about the 1 foot error level.

The best way is to pay about $5K for a professional survey. This will get

you down to the cm level.

Rick
WB2TNL

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Boyd
Prestwood
Sent: Tuesday, March 24, 1998 11:07 PM
To: tacgps@tapr.org
Subject: [TACGPS:1194] Re: DGPS REF STA vs. US COAST GUARD

[clip]

I let TAC32 run for 44 hours and used the average for my precision
position. It hadn't changed for several hours so I stopped it at 44 hrs...
I assume that's about as good as I'm gonna get it, eh?

Thanks again for your time to reply. It was much appreciated.

73 de Boyd W2HOB New Jersey

106. Re: [TACGPS:1195] RE: DGPS REF STA vs. US COAST GUARD

From: Boyd Prestwood <w2hob@mosquito.com>
Date: Wed, 25 Mar 1998 09:59:09 -0500
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19980325095909.006c5c50@mail.mosquito.com>
Rendered body type: text/plain

At 06:18 AM 3/25/98 -0600, Rick Hambly, WB2TNL wrote:

>A single average should be within 5 meters, or so.
>
>If you want the best reference location for your DGPS station, run TAC32 in
>the averaging mode a few times for periods of 24 hours or longer. Write down
>each result and manually average the results. This will give you a better
>result than a single average. Should be within a meter or two.

W2HOB RESPONSE: Thanks Rick. That info is also just what I'm looking for
and I'll do a few more averages to average together. Now, you mentioned
the "averaging mode"... is that the same as just reading the AVERAGE
position from the display in TAC32? I don't need to click on anything
special to put TAC32 in any specific mode, do I?

>A better way to do this is to collect RINEX data and post-process with a
>standard reference station. We do not have RINEX working in TAC32 yet,
>however and the post-processing software costs $300-$1,500. This should get
>you to about the 1 foot error level.

W2HOB: This would be great but I'm in the ham radio/APRS/GPS hobby, not
commercial engineering!! The $300 would be ok but $1500 is out of the
question... wow and the $5000 for a survey... holy molie!!!

A least you've shown me what the professionals charge/pay for this kind of
stuff... very enlightening!!! Thanks again for your info.

73 de Boyd W2HOB
w2hob@mosquito.com

107. RE: DGPS REF STA vs. US COAST GUARD

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Wed, 25 Mar 1998 10:28:02 -0500
To: <tacgps@tapr.org>
Message-ID: <199803251526.KAA25777@gw.cnssys.com>
Rendered body type: text/plain

Boyd,

Yes, but you might want to go to the averaging screen and look at its help
page. You can select to use DOP weighting, for example. I think that will
improve the results slightly. The averaging screen has lots of statistical
numbers. You might find the Reference to Average lines interesting before
resetting the averages.

Rick
WB2TNL

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Boyd

Prestwood
Sent: Wednesday, March 25, 1998 10:03 AM
To: tacgps@tapr.org
Subject: [TACGPS:1196] RE: DGPS REF STA vs. US COAST GUARD

[clip]

Now, you mentioned
the "averaging mode"... is that the same as just reading the AVERAGE
position from the display in TAC32? I don't need to click on anything
special to put TAC32 in any specific mode, do I?

[clip]

73 de Boyd W2HOB
w2hob@mosquito.com

108. Re: [TACGPS:1197] RE: DGPS REF STA vs. US COAST GUARD

From: Boyd Prestwood <w2hob@mosquito.com>
Date: Wed, 25 Mar 1998 10:58:51 -0500
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19980325105851.006c2610@mail.mosquito.com>
Rendered body type: text/plain

At 09:29 AM 3/25/98 -0600, WB2TNL wrote:

>Yes, but you might want to go to the averaging screen and look at its help
>page. You can select to use DOP weighting, for example. I think that will
>improve the results slightly. The averaging screen has lots of statistical
>numbers. You might find the Reference to Average lines interesting before
>resetting the averages.

W2HOB RESPONSE: Ok, will do and thanks again.
73 de Boyd

109. Re: [TACGPS:1196] RE: DGPS REF STA vs. US COAST GUARD

From: Randolph Bentson <bentson@grieg.holmsjoen.com>
Date: Wed, 25 Mar 1998 10:52:37 -0800
To: tacgps@tapr.org
Message-ID: <199803251852.KAA16253@grieg.holmsjoen.com>
Rendered body type: text/plain

If/When I set up a local reference station, I'll likely
validate my system by checking against local benchmarks.
I've already found several nearby benchmarks by going to
    http://WWW.ngs.noaa.gov/FORMS/ds_area.html

Hmmm, one of the benchmarks is attached to a local high
school building. I can imagine establishing a reference
station AT that benchmark in cooperation with a student
radio club.

Randolph Bentson

110. Re: [TACGPS:1196] RE: DGPS REF STA vs. US COAST GUARD

From: Jeff King <jeff@mich.com>
Date: Wed, 25 Mar 1998 14:27:42 -0500
To: tacgps@tapr.org, Boyd Prestwood <w2hob@mosquito.com>
Message-ID: <3.0.5.32.19980325142742.00ae9100@mail.mich.com>
Rendered body type: text/plain

At 09:02 AM 3/25/98 -0600, Boyd Prestwood wrote:
>At 06:18 AM 3/25/98 -0600, Rick Hambly, WB2TNL wrote:
>
>>A better way to do this is to collect RINEX data and post-process with a
>>standard reference station. We do not have RINEX working in TAC32 yet,
>>however and the post-processing software costs $300-$1,500. This should get
>>you to about the 1 foot error level.
>
>W2HOB: This would be great but I'm in the ham radio/APRS/GPS hobby, not
>commercial engineering!! The $300 would be ok but $1500 is out of the
>question... wow and the $5000 for a survey... holy molie!!!

I believe Tom Clark alluded to this a number of months ago, but
since the topic of cost effectiveness and accuracy keeps
coming up, I do want to mention

there is another alternative to the Oncore/tapr DGPS combo.

Use the coast guard DGPS signal itself, and rebroadcast the
bits on your local 2m aprs channel. That way you can take advantage
of the $$$ paid by the government to survey the site. Comparing
the two solutions on a cost basis you come up with this:

Tapr DGPS		Coast Guard DGPS		
Motorola Oncore VP	$220	Garmin GRM 21 Diff	$449	(tacgps:1190)
TAPR DGPS board $179				
Total	$399		$449	

This doesn't factor in the cost of the 2metre transmitter and tnc
which would be needed for both approaches.

To be fair, you'd likely need to have some mediator between the
Coast Guard DGPS receiver both for technical and legal reasons,
but this could be some basic program on a throwaway 286 or possibly
could be integrated within the various flavors of APRS. The
other issue would be if the federal government instructed the
coast guard to turn off the DGPS beacon, which would seem unlikely.
Also, if you don't have a C.G. DGPS beacon in your area, you'd not
be able to use this approach. Most other DGPS services are not
"free" and would not take kindly to you re broadcasting there
bits.

Just a additional thought for discussion.

-Jeff

111. Re: [TACGPS:1197] RE: DGPS REF STA vs. US COAST GUARD

From: "Ira A. Wilner" <bdcst@vermontel.com>
Date: Wed, 25 Mar 1998 20:04:32 -0500
To: "Richard M. Hambly" <rick@cnssys.com>, tacgps@tapr.org
Message-ID: <199803260100.UAA10751@eureka.vermontel.com>
Rendered body type: text/plain

Rick Hambly wrote:

> Boyd,
>
> Yes, but you might want to go to the averaging screen and look at its help
> page. You can select to use DOP weighting, for example. I think that will
> improve the results slightly. The averaging screen has lots of statistical
> numbers. You might find the Reference to Average lines interesting before
> resetting the averages.
>
> Rick
> WB2TNL

Rick,

While we wait for some sort of RINEX file/post processing solution,
what about those of us who might already have access to a DGPS
reference station such as USCG MSK beacon? Can the VP Oncore be
easily put in DGPS mode via TAC-32 or TAC-2 software, fed standard
RTCM 104 DGPS reference sentences, those fixes then averaged over
time to achieve a good antenna fix?

Do the USCG beacons send carrier phase data? Or is that data only
available via the posted CORS RINEX data files? In other words,
which is better, live or post processed DGPS from the USCG/CORS
stations?

One benefit of the CORS RINEX files, in my case, is a shorter
baseline from the nearest CORS reference station compared to the
on air beacons. In fact at my QTH the USCG beacons are just out of
range. Instead I can pick up one inland CCG (Canadian Coast Guard)
beacon near Vermont's northern border.

I learned today that the inexpensive Post Processing program
PostPnt, only uses code data, not carrier phase. Thus it cannot take
advange of the VP Oncore and CORS RINEX capability to provide much
more accurate fixes.

It is sort of ironic having a GPS receiver costing only $300 but
requiring carrier phase post processing software costing $2500 or

more!

-Ira

112. gps-20 or oncore ?

From: peter van daalen <peter@vandaalen.demon.nl>
Date: Thu, 26 Mar 1998 03:05:36 +0100
To: "tacgps@tapr.org" <tacgps@tapr.org>
Message-ID: <3519B7F0.BC89D486@vandaalen.demon.nl>
Rendered body type: text/plain

I want to lock very narrow band 24 Ghz (< 10 Hz fft-dsp filter bw)
on the coming TOC.

1. is 1 pp 10-10 per 15 min. a realistic goal with TACTOC ? If not,
why ?
2. does, for my purpose, GPS-20 make any difference with ONCORE-VT ? If
so, why ?
3. would ONCORE-UT-PLUS improve over VT ? If so, why ?

73 de Peter PE1ECM

113. Re: [TACGPS:1202] gps-20 or oncore ?

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Thu, 26 Mar 1998 06:51:26 +0000
To: tacgps@tapr.org
Message-ID: <3519FAEE.AB346D5B@clark.net>
Rendered body type: text/plain

peter van daalen wrote:
>
> I want to lock very narrow band 24 Ghz (< 10 Hz fft-dsp filter bw)
> on the coming TOC.
>
> 1. is 1 pp 10-10 per 15 min. a realistic goal with TACTOC ? If not,
> why ?
> 2. does, for my purpose, GPS-20 make any difference with ONCORE-VT ? If
> so, why ?
> 3. would ONCORE-UT-PLUS improve over VT ? If so, why ?
>
> 73 de Peter PE1ECM

Peter -

First, for factoids I refer you to my aleph file server at URL
   ftp://aleph.gsfc.nasa.gov/GPS/

With the GPS-20, you will be luck to get 1:10e9. The -20 is a really poor
timing
receiver. If you look at the G-20 timing plots I have posted on aleph in the
directory ~/totally.accurate.clock/ (which were also reproduced in part in
TAPR's
PSR last year), you will see that the G-20 is subject to some pretty wild
timing
jumps and its timing performance is not at all predictable at anything better
than ~1 microsecond. It appears that this is because the G-20 is a sequential
receiver that multiplexes its 2 channels among the satellites in view. Every
time it changes its mind about which satellites are good to track, the G-20
goes
berserk for a while. Since these ~1 microsecond jumps occur every ~1000
seconds,
the frequency you derive will be jerked at levels of (1 usec/1000 sec) or
~1:10e9.

MUCH better than the G-20 in many ways if the newer 12-channel parallel G-25.
I have been measuring the timing performance of a -25 for the past couple of
weeks and it can be set up to be "smooth" at the ~100 nsec level. However the
epoch of the 1PPS pulse wanders on time scales of ~1 day with drift rates of
around 1 usec/day (i.e. ~1:10e11 if it is used to provide a frequency
reference).

By far the best timing receiver is the Motorola ONCORE. The VP (as offered by
TAPR) is the "Mercedes" version, with all possible features enabled. The UT and
UT+ are stripped down versions -- like a Volkswagen. If you are only interested
in "basic trqansportation" (good timing performance) then the UT or UT+ are
fine.
But if you want to experiment with other things, (like some of us are doing
with
DGPS), then you should spend the extra cost and get a VP. [Do not consider the

ONCORE GT for timing use].

Now let me try to answer your other question. The performance you can get will be very dependent on the performance of the crystal oscillator. Take a look on aleph in the directory ~/tapr_dcc/ at any of the allanv plots. These show typical
Allan Variances for a number of different frequency standards. The Allan Variance
is basically a statistical characterization of an oscillator. It gives the RMS difference (noise level) in frequency (deltaF/F) or time (deltaT/T) that can be expected after a time T has elapsed.

A good crystal oscillator can be an EXCELLENT frequency standard on short time scales (you can hear the carrier at 24 GHz !), but they drift with time and temperature so the long-term accuracy/stability is poor. A GPS clock is very good at long terms (we can transfer time to ~10 nsec day-after-day) but it has poor short term performance (due to receiver limitiation and SA=selective availability). The goal in the TOC is to use the composite of the two to get better performance.

At the 15 minute (i.e. ~1000 sec) level you want, the performance will be strongly
influenced by how good the crystal you use is. The "cheap" crystal line on the plots is typical of a ~$30-$40 tunable TCXO we have been thinking about for the TAPR TOC. The "good" xtals typically cost a few hundred dollars and have ovens (since the thermal drifts dominat performance). Many people have pick up some pretty good xtals at hamfests and on surplus, but it requires luck. [The Hydrogen Maser line reflects a really good ~$4000 xtal out to ~100 seconds;
 in masers, the PLLs have time constants in the 100-1000 second range.]

A few of us have been involved in an active discussion as to just what the TAPR TOC should be. On one hand, we have an approach that should give 1:10e9 (maybe as good as 1:10e10) at 100-1000 sec using a very simple locking circuit. When a suitable "cheap" xtal is included, this TOC design should add ~$100-$200 to the price of the GPS engine. The other approach is quite a bit more complicated
and would cost several times as much, but would yield better performance.

I would like to ask the TACGPSers who want a TOC just what price/performance level you need. A level of 1:10e9 means that if you use the clock as the time base for a counter, it will be accurate at a level ~1 Hz at 1 GHz. If such a widget cost ~$100-$200, are you interested? Or if we do the more elaborate
TOC (including a better xtal), you might get a factor of 10-100 better performance,
but it might cost $500-$600 -- is this of more interest? How good do you really need/want? (An off-the-shelf HP58503 costs ~$5000).

73, Tom

114. Re: [TACGPS:1201] RE: DGPS REF STA vs. US COAST GUARD

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Thu, 26 Mar 1998 07:09:23 +0000
To: tacgps@tapr.org
Message-ID: <3519FF23.362CB642@clark.net>
Rendered body type: text/plain

Ira A. Wilner wrote:
> [snip]
> While we wait for some sort of RINEX file/post processing solution,
> what about those of us who might already have access to a DGPS
> reference station such as USCG MSK beacon? Can the VP Oncore be
> easily put in DGPS mode via TAC-32 or TAC-2 software, fed standard
> RTCM 104 DGPS reference sentences, those fixes then averaged over
> time to achieve a good antenna fix?

The ONCORE and Garmin engines both accept RTCM SC-104 DGPS signals when running in NMEA mode already. Nothing special is needed. I designed the TAC-2 with dual RS232 ports for just this purpose, even though the GPS rcvr may only have a single data input.

Since both the computer and the DGPS beacon receiver are sending data to the GPS rcvr, I recommend you put the computer on Port#1 and DGPS on Port#2. The TAC-2 has an "RS232 squelch". Whenever data is coming into Port#1 (computer) it temporarily shuts off Port#2 (DGPS) so that the two bit streams don't interfere with each other.

> Do the USCG beacons send carrier phase data? Or is that data only
> available via the posted CORS RINEX data files? In other words,
> which is better, live or post processed DGPS from the USCG/CORS
> stations?

No, both the USCG and TAPR DGPS generators only transmit the pseudo-
range (PR) and rate (PRR) corrections. The PR corrections are
derived from the code phase (although the generator rcvrs use
carrier phase to smooth out the code phase noise). The PRR data
is derived from the time-rate-of-change of carrier phase (=frequency
offset). There are more fancy carrier-phase based systems out there,
but the simple meter-ish level DGPS all works on the C/A code.

> One benefit of the CORS RINEX files, in my case, is a shorter
> baseline from the nearest CORS reference station compared to the
> on air beacons. In fact at my QTH the USCG beacons are just out of
> range. Instead I can pick up one inland CCG (Canadian Coast Guard)
> beacon near Vermont's northern border.

The "RINEX" (which stands for Receiver INdependent EXchange format)
standard can include both C/A code and carrier phase data, at both
the L1 & L2 frequencies. A "beta" RINEXer for the ONCORE exists for
the code portion.

Not all the ONCOREs you all have have the carrier phase data output
option enabled -- it costs extra. The ONCORE rcvrs that TAPR has
been offering DO NOT have the carrier phase option.

> I learned today that the inexpensive Post Processing program
> PostPnt, only uses code data, not carrier phase. Thus it cannot take
> advange of the VP Oncore and CORS RINEX capability to provide much
> more accurate fixes.

I don't understand this comment. It looks like this is the RIGHT
software to use with the normal ONCOREs you all have.

> It is sort of ironic having a GPS receiver costing only $300 but
> requiring carrier phase post processing software costing $2500 or
> more!
>
> -Ira

73, Tom

115. Re: [TACGPS:1203] Re: gps-20 or oncore ?

From: Dave Martindale <davem@cs.ubc.ca>
Date: Thu, 26 Mar 1998 10:54:26 -0800
To: tacgps@tapr.org
Message-ID: <l03130300b140539cf884@[198.162.38.159]>
Rendered body type: text/plain

>I would like to ask the TACGPSers who want a TOC just what price/performance
>level you need. A level of 1:10e9 means that if you use the clock as the
>time base for a counter, it will be accurate at a level ~1 Hz at 1 GHz. If
>such a widget cost ~$100-$200, are you interested?

My main interest in the TOC is to provide an accurate 10 MHz timebase
input to a frequency counter. Since the counter only has 8 digits of
display, frequency stability of 1:10e9 over a period of 10 seconds
(the longest gate time) would be better than anything I need. If that
can be done with a cheap crystal, that's great.

I don't need better performance than that. And if better performance
cost $500-600 US, that's getting too expensive for me. (I assume that
you have to add the cost of the TAC circuitry plus the GPS receiver
to that).

        Dave

116. Re: [TACGPS:1203] Re: gps-20 or oncore ?

From: "Doug McKinney" <buoy@redshift.com>
Date: Thu, 26 Mar 1998 12:55:52 -0800
To: <tacgps@tapr.org>
Message-ID: <001001bd58f9$9279d1c0$77c6cccf@buoy.mcktech.com>
Rendered body type: text/plain

-----Original Message-----
From: Tom Clark (W3IWI) <tac@clark.net>
To: tacgps@tapr.org <tacgps@tapr.org>

Date: Wednesday, March 25, 1998 10:59 PM
Subject: [TACGPS:1203] Re: gps-20 or oncore ?

>I would like to ask the TACGPSers who want a TOC just what
price/performance
>level you need. A level of 1:10e9 means that if you use the clock as the
>time base for a counter, it will be accurate at a level ~1 Hz at 1 GHz. If
>such a widget cost ~$100-$200, are you interested? Or if we do the more
>elaborate
>TOC (including a better xtal), you might get a factor of 10-100 better
>performance,
>but it might cost $500-$600 -- is this of more interest? How good do you
>really need/want? (An off-the-shelf HP58503 costs ~$5000).
>
>73, Tom
>
>

Price/performance level of interest is the 1:10e9 (TOC9) at the $100-200 range. A $500-600 range (TOC10) means I am seriously interested.
I am not seriously interested, therefore, I would not spend $500-600 for a TOC10. I believe there are interests in both and both should be built. I suggest that the TOC9 be built first and income from the TOC9 be available for the TOC10. Popularity for the TOC9 will provide some indication for the TOC10. Also the TOC10 should appeal to the commercial world and should be developed with that goal in mind!
73's
Doug

117. TOC comments

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Thu, 26 Mar 1998 18:01:48 -0500
To: "TAC-2 mail list" <tacgps@tapr.org>
Message-ID: <000701bd590b$3c6e0f00$481f5c18@john.tampabay.rr.com>
Rendered body type: text/plain

Tom Clark wrote:

>I would like to ask the TACGPSers who want a TOC just what
price/performance
>level you need. A level of 1:10e9 means that if you use the clock as the
>time base for a counter, it will be accurate at a level ~1 Hz at 1 GHz. If
>such a widget cost ~$100-$200, are you interested? Or if we do the more
>elaborate
>TOC (including a better xtal), you might get a factor of 10-100 better
>performance,
>but it might cost $500-$600 -- is this of more interest? How good do you
>really need/want? (An off-the-shelf HP58503 costs ~$5000).

>73, Tom

Tom --

Here are my comments regarding the TOC project:

I have two very good oscillators that I picked up at hamfests/surplus sales. One is an FTS-1000 5MHz standard that has a long-term stability of <1x10e-10/day and a short-term stability (Allan variance) of <1x10e-12 for 1 to 100 seconds. The other unit is an HP-10544A 10 MHz standard that has a long-term stability of <5x10e-10/day and a short-term stability of <2x10e-11 for 100 seconds. Both oscillators can be "disciplined" with a DC control voltage to phase-lock them to a secondary standard. My goal is to build the best frequency/time standard that I possibly can utilizing one or both of these units and the upcoming TAPR TOC board to lock them to GPS. You have already convinced me that I should replace my Garmin GPS-20 with a Motorola ONCORE VP which I will order from TAPR when the TOC project gets rolling.

Here are my questions for the moment:

(1) Will the ONCORE VP directly replace the GPS-20 on the TAPR TAC interface board?

(2) Will the design of the TOC furnish the DC control voltage to steer the oscillators into phase-lock? I am not quite sure how the TOC will discipline the local standards. How will this be done?

(3) Should I be building dividers to divide the 5MHz and 10MHz standards
down to 1 PPS? Will the TOC compare these with the 1 PPS from the GPS
receiver and furnish a correction voltage or will there be some other
phase-locking arrangement?

I am eagerly awaiting the roll-out of the TOC project. Can't wait to get
started!

73, John W4SF

118. Re: [TACGPS:1203] Re: TOC 1pp 10e9 or 10e11 ?

From: peter van daalen <peter@vandaalen.demon.nl>
Date: Fri, 27 Mar 1998 00:21:26 +0100
To: tacgps@tapr.org
Message-ID: <351AE2F6.EED47843@vandaalen.demon.nl>
Rendered body type: text/plain

Tom Clark (W3IWI) wrote:

> peter van daalen wrote:
> >
> > 1. is 1 pp 10-10 per 15 min. a realistic goal with TACTOC ? If not,
> > why ?
> > >
> > 73 de Peter PE1ECM
>
> Peter -
> .....
> Now let me try to answer your other question. The performance you can get will
> be very dependent on the performance of the crystal oscillator. Take a look on
> aleph in the directory ~/tapr_dcc/ at any of the allanv plots. These show
> typical
> Allan Variances for a number of different frequency standards. The Allan
> Variance
> is basically a statistical characterization of an oscillator. It gives the
> RMS difference (noise level) in frequency (deltaF/F) or time (deltaT/T) that
> can be expected after a time T has elapsed.
>
> A good crystal oscillator can be an EXCELLENT frequency standard on short time
> scales (you can hear the carrier at 24 GHz !), but they drift with time and
> temperature so the long-term accuracy/stability is poor. A GPS clock is very
> good at long terms (we can transfer time to ~10 nsec day-after-day) but it has
> poor short term performance (due to receiver limitiation and SA=selective
> availability). The goal in the TOC is to use the composite of the two to get
> better performance.
>
> At the 15 minute (i.e. ~1000 sec) level you want, the performance will be
> strongly
> influenced by how good the crystal you use is. The "cheap" crystal line on the
> plots is typical of a ~$30-$40 tunable TCXO we have been thinking about for
> the TAPR TOC. The "good" xtals typically cost a few hundred dollars and have
> ovens (since the thermal drifts dominat performance). Many people have pick
> up some pretty good xtals at hamfests and on surplus, but it requires luck.
> [The Hydrogen Maser line reflects a really good ~$4000 xtal out to ~100
> seconds;
> in masers, the PLLs have time constants in the 100-1000 second range.]
>
> A few of us have been involved in an active discussion as to just what the
> TAPR TOC should be. On one hand, we have an approach that should give 1:10e9
> (maybe as good as 1:10e10) at 100-1000 sec using a very simple locking circuit.
> When a suitable "cheap" xtal is included, this TOC design should add ~$100-$200
> to the price of the GPS engine. The other approach is quite a bit more
> complicated
> and would cost several times as much, but would yield better performance.
>
> I would like to ask the TACGPSers who want a TOC just what price/performance
> level you need. A level of 1:10e9 means that if you use the clock as the
> time base for a counter, it will be accurate at a level ~1 Hz at 1 GHz. If
> such a widget cost ~$100-$200, are you interested? Or if we do the more
> elaborate
> TOC (including a better xtal), you might get a factor of 10-100 better
> performance,
> but it might cost $500-$600 -- is this of more interest? How good do you
> really need/want? (An off-the-shelf HP58503 costs ~$5000).
>
> 73, Tom

Tom,

Thanks vm for lightning fast and extensive reaction. I studied your ftp.files and I guess I got it right now.
(Or didn't I, tell me).

Just one more thing.
How could the X-tal oscillators' performance with TACTOC s t r o n g l y influence the 1000 seconds term
drift ?

An average quality TCXO (0,1 ppm) could have a 1000 seconds drift much in excess of the Oncores'
per-second-level : (1.10e-7 . 10e+11) >> ~ +/- 130.

But even a labquality OCXO (I can buy one out here, KVG brand, at DFls 900 ~ US.$. 440 , 10 Mhz, standard off the shelf, 5pp10e10 / degrC (-25-+70degrC) has a break even term of only 260 seconds (5.10e-10 . bep(ns) = ~ +/- 130)

So, I cannot see - my simplifications despite - where I slipped off the road in presuming that TOC, even in
terms as short as from four minutes on is not redundant . So, I would think that my 24 Ghz RxTx with 10 Hz
filterwidth is in need of TACTOC X-tal disciplining long before the 15 minutes level, even with the above mentioned labgrade OCXO. Please clear me up.

Of course, I feel the principal question remains, how TAC can discipline TOC to drift < 5.10e10 (~ 10 Hz filterwidth on
24 Ghz) during the first few minutes, independant of moment of power on.

Needless to say, on your question, that I would opt for the 10e11 TOC version even at US.$5-600.

73
Peter PE1ECM

119. TOC comments

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Fri, 27 Mar 1998 02:00:34 -0500
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980327020034.00810bb0@appstate.campus.mci.net>
Rendered body type: text/plain

>A few of us have been involved in an active discussion as to just what the
>TAPR TOC should be. On one hand, we have an approach that should give 1:10e9
>(maybe as good as 1:10e10) at 100-1000 sec using a very simple locking circuit.
>When a suitable "cheap" xtal is included, this TOC design should add ~$100-$200
>to the price of the GPS engine. The other approach is quite a bit more >complicated
>and would cost several times as much, but would yield better performance.
>
>I would like to ask the TACGPSers who want a TOC just what price/performance
>level you need. A level of 1:10e9 means that if you use the clock as the
>time base for a counter, it will be accurate at a level ~1 Hz at 1 GHz. If
>such a widget cost ~$100-$200, are you interested? Or if we do the more >elaborate
>TOC (including a better xtal), you might get a factor of 10-100 better >performance,
>but it might cost $500-$600 -- is this of more interest? How good do you
>really need/want? (An off-the-shelf HP58503 costs ~$5000).
>
>73, Tom
>

Tom,

My first reaction is why not design to accommodate either the "cheap" xtal or expensive "OVCXO" (I think I got that right--oven, voltage controlled, xtal osc). I've tinkered with some ideas for a poor-man's OVCXO disciplined to the GPS, and allowing for a cheap xtal as well as a gold-plated special seemed reasonable. W4OQM and I have talked about the project a little, and gone as far as getting some specs on Bliley oscillators (the specs on these are great--but at the moment we don't have prices). We are both *very* busy with school, (i.e. dissertations), on top of lesser important things such as living. Consequently, this project isn't getting much attention at the moment.

As far as accuracy goes, it would be "nice" to have the ultimate in accuracy. We have a couple of 10 Ghz commercial units that can be easily

converted to the amateur band & SSB (also a project awaiting completion of
school-stuff). The osc's have provision for phase-locking, making the idea
of pre-setting the frequency for a SSB contact and being in the passband
"interesting." Another use that comes to mind is to use the TAO to feed
the master osc in the rig(s). My IC-706 Mk II phase-locks everything to
one osc, so if that is "bang-on," then one has can tune to 1 hz--absolute!
Actually, 1E-9 is probably quite satisfactory for this purpose.

In general, my thinking has been along the lines of a master oscillator,
driving various things in the shack (i.e. locking oscillators to the master).

The scheme I have been contemplating has been to use a micro such as the
Mot HC11 (mainly because I've been using them and have everything needed,
no learning curve, etc.); drive the processor clock with the master osc
(essentially let the micro divide it down to 1 pps); use the input-capture
feature to compare internally generated 1 pps with the GPS 1 PPS; "mess
around" with the control algorithm (the experimental, fun part); produce a
PWM output, which via a very low-cutoff RC filter produces a "DC" VCXO
control voltage; and/or, measure temp and vary the power to a heater
resistor "glued" to the xtal and temp sensor, to control temp (and hence
freq). I haven't put pencil-to-paper, but intuitively it seems that a temp
control, i.e. oven of some sorts, is needed to prevent the rate of freq
change due to enviromental temp change to be much less than rate of change
that the GPS can control, i.e. if the temp changes too rapidly the long
time needed to "average" out the GPS signal will not "keep up with" freq
change due to temp change.

Finally, the cost of the high quality TCXO options on the new rigs isn't
exactly cheap! (As I remember, the FT-1000 xtal option is in the $250+
range.) This puts the cheap version of TAO in the same ballpark, and with
much better specs. Even the expensive version isn't all that bad.

Now, back to the dissertation.

73's
Don, W4DH

120. Re: [TACGPS:1203] Re: gps-20 or oncore ?

From: "Ira A. Wilner" <bdcst@vermontel.com>
Date: Thu, 26 Mar 1998 23:04:59 -0500
To: "Tom Clark (W3IWI)" <tac@clark.net>, tacgps@tapr.org
Message-ID: <199803270401.XAA12793@eureka.vermontel.com>
Rendered body type: text/plain

Tom,

I'd settle for a TOC disciplined oscillator at 1X10-9 I think that
it would be fine for most frequency calibration requirements for RF
signal generation at home and then some. But, on the other hand, it
would be nice to consider having rubidium standard performance on a
beer budget just to do it. 2X10-10 comes to mind.

--Ira

121. Re: [TACGPS:1204] RE: DGPS REF STA vs. US COAST GUARD

From: "Ira A. Wilner" <bdcst@vermontel.com>
Date: Thu, 26 Mar 1998 23:04:59 -0500
To: "Tom Clark (W3IWI)" <tac@clark.net>, tacgps@tapr.org
Message-ID: <199803270401.XAA12806@eureka.vermontel.com>
Rendered body type: text/plain

Tom Clark wrote:
>
> The ONCORE and Garmin engines both accept RTCM SC-104 DGPS signals
> when running in NMEA mode already. Nothing special is needed. I
> designed the TAC-2 with dual RS232 ports for just this purpose,
> even though the GPS rcvr may only have a single data input.

(SNIP)

Wonderful.

>
> Not all the ONCOREs you all have have the carrier phase data output
> option enabled -- it costs extra. The ONCORE rcvrs that TAPR has
> been offering DO NOT have the carrier phase option.

Please check again, Tom. I'm told that TAPR is shipping the

B8121Z1156 board which is the newer version of the B4121P115x VP
Oncore. According to the data sheet from Synergy Systems, Tech Note
310, this model now has raw data output and one of the feature codes
is CP, carrier phase!

>
> > I learned today that the inexpensive Post Processing program
> > PostPnt, only uses code data, not carrier phase. Thus it cannot take
> > advange of the VP Oncore and CORS RINEX capability to provide much
> > more accurate fixes.
>
> I don't understand this comment. It looks like this is the RIGHT
> software to use with the normal ONCOREs you all have.

Well, if the new TAPR provided VP Oncores have carrier phase raw data
output (see above) then we really need affordable post processing
software that can use carrier phase for really accurate location
fixes in a reasonably short amount of time.

I repeat:
>
> > It is sort of ironic having a GPS receiver costing only $300 but
> > requiring carrier phase post processing software costing $2500 or
> > more!
> >

73, Ira

122. Re: [TACGPS:1209] TOC comments

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Fri, 27 Mar 1998 05:33:01 +0000
To: tacgps@tapr.org
Message-ID: <351B3A0D.B095CD30@clark.net>
Rendered body type: text/plain

Let me try to reply to a number of the questions/comments about my
note on the TOC. First to Tom van Baak:
> Are you referring to the TAC-GPS mail about the TOC
> design from a few months ago, or have I been missing
> a bunch of good stuff recently on some other list?

It's basically the same activity that was actively being discussed
on TACGPS some months ago. Things were pretty quiet for several months
thru the winter -- I had some personal mid-life crisis distractions,
and I went into a thinking/studying mode. Also, the TACGPS group went
from being a small group of hard-core addicts to serve a much wider
audience, so it became a less suitable vehicle for discussion. I showed
the generic design at the TAPR/ARRL DCC in October -- the block diagram
is on aleph at URL ftp://aleph.gsfc.nasa.gov/GPS/tapr_dcc/toc-blok.zip .

A very small subset of people have resumed the earlier discussions,
trying to see if we could converge on a design. A few weeks ago I
became a bit frustrated/concerned with the cost/complexity/user
support of the high-accuracy design, based on all the things I've
been thinking of in the past ~6 months.

To refresh memory, the original TOC conceptual design (for a really
high accuracy TOC) involved a fairly complex set of digital logic,
a microprocessor, and a high-res D/A converter. To keep the unit
cost down and minimize the needed PCB real estate, we were thinking
in terms of putting much of the digital widgets into a custom chip
(actually a FPGA), but we amateurs have limited design/debug VHDL resources to
do this (one person has volunteered, and fortunately
has the expen$ive design tools).

Early on, we decided that the TOC had to come with a default "pretty
good" xtal oscillator. Nobody else came forth with a selection, so
I spent quite a bit of time trying to find the best compromise. Unless
somebody has a better suggestion, my choice is a RAKON 4080 (Rakon is
in New Zealand. Their hardware can be viewed on http://www.rakon.com
and the 4080 is on the TCVCXO page), which will cost in the $25-30
range. Any better oscillator I could found came in at prices in the
$200-500 range. Our design goals were that if a user had a better
oscillator, it could be used.

If the user want to be able to use a better xtal, he must be prepared
to tweak the microprocessor filter algorithms and coefficients. This,
plus my judgement that some of the arithmetic needed to be double-
precision (integer or floating), leads to a fairly elaborate micro

with good user-level support -- far more capability than the Basic
Stamp I originally envisioned, or the PIC that others have suggested.
This called for a more complex TOC.

To capitalize on capabilities that would be inherent in such a TOC
design, the oscillator steering D/A converter needs to have very
high resolution (like 14 to 16 bits), and this also added complexity.
And all these complexity issues (none of which is insurrmountable)
make it very difficult to come up with a converging project done
by amateurs at home, at night, in their basements within a finite
time interval.

And yet, people keep asking for a TOC. They look to TAPR to make it
happen RSN (Real! Soon! Now!). A couple of weeks ago I came up with
a totally heretical RD (Radical, Dude!) idea. If we restrict the TOC
to an oscillator in the Rakon 4080 class, then the filter time needed
for the noise on the xtal to match GPS is in the 100-1000 second
range. I came up with (here is what's radical) an idea to do all
the control functions in ANALOG circuitry with no microprocessor and
no D/A converter. To get analog time constants in the 100-1000 second
range requires some cleverness and careful component selection, but
I think I see a way to do it. It requires a design layout that makes
some elements have leakage resistances in the GigaOhm range. But
the ionization smoke detector you buy at K-Mart for $10 has similar
"electrometer" specifications, so it CAN be done!

Just today I built a fairly elaborate computer model for the analog
TOC (in an Excel spreadsheet). The design is still too much in the
formulative stages to post the details, but I'll give a couple of
hints. The widget that measures the time difference between the GPS
1PPS and the divided clock is one of the phase/freq detectors in a
4046 IC. The high isolation amplitude integrator uses switched-
capacitor techniques with 4066 CMOS switches. And some of the new
op amps that have appeared in the past couple of years have really
state-of-the-art performance with picoampere to femtoampere bias
currents available for a few $$.

So Tom -- although things have been quiet, things have been happening.
Absence of evidence is not evidence of absence!

The basis of the "cheap" vs "elegant" TOC question I posed last nite
was to get some advice from the users as to what they want/need.

Now to answer some of the other questions: Don Haselwood wrote:
> My first reaction is why not design to accommodate either the "cheap" xtal
> or expensive "OVCXO" (I think I got that right--oven, voltage controlled,
> xtal osc). I've tinkered with some ideas for a poor-man's OVCXO
> disciplined to the GPS, and allowing for a cheap xtal as well as a
> gold-plated special seemed reasonable. [snip]

There should be no reason that you couldn't use a different oscillator.
And if you can find a better one (in cost vs. performance) than the Rakon
PLEASE PLEASE let us know!

In the analog TOC scheme, I think I can see how to get the filters out to
times in the 100-1000 second range, which is a good match for the Rakon-class
of oscillator. If the oscillator is much better than this, then the more
elaborate digital TOC is clearly the way to go.

Brian Mullaney commented:
> Which brings up a question - Do you know if the various OEM boards from
> Ashtech are any good? The data sheets claim good numbers, when you compare
> them to (at least) the Garmin boards:
>
> Ashtech (data sheet #s)
> G8 1PPS +/- 1usec
> G12 1PPS +/- 200nsec
> GG24 1PPS +/- 70nsec (GLONASS + GPS board)
>
> I haven't called to find out how much the eval kits are (no money) :-(

The Ashtech units are untried. The thing that makes the ONCORE be so good is
that it has a mode that permits you to "lock" its position (I call it the
"zero-D" navigation mode) with all the available satellites being used to
determine the GPS clock. This makes a BIG improvement in the timing
performance, as can be seen in one plot on my aleph file server at URL
    ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/oso-d270.gif

(this plot has a minor error -- the Y-axis says the units are usec, but they
are really nsec!). Check to see if Ashtech has a position contraining
"zero-D" mode. FYI -- the Garmin G-25 does not support "zero-D", but it
can be forced into 2-D mode and the timing performance is MUCH better.
Sometime RSN I'll post the plots of my G-25 testing.

Peter van Daalen wrote:
> [snip]
> Just one more thing.
> How could the X-tal oscillators' performance with TACTOC s t r o n g l y
> influence the 1000 seconds term drift ?

Peter -- let's look at how an xtal works: It is a slab of quartz that is
mechanically resonant at some frequency. Quartz is a piezoelectric material,
so an applied voltage makes it change its size/shape. It is put into a
feedback loop and it oscillates. It's frequency is determined by the physics
of these processes:
  - It's size/shape changes as a function of its thermal environment (as well
    as the thermal properties of the external components)
  - The crystal is mechanically oscillating. When this happens, some of the
    crystal's microscopic flaws break. This causes the xtal to age. Sometimes,
    if the breaks are big enough, it jumps frequency. And if you bang it hard,
    you break more of the crystal bonds.
  - If the xtal's housing has any contamination in it, it will slowly deposit
    crud on the xtal, causing more drift.
  - The feedback loop has to be carefully controlled. If it is too weak, then
    the S/N is poor and the oscillator is noisy. If it is too strong, you
    break more of the crystal bonds and the oscillator drifts/jumps.
A really good xtal oscillator is based on the selection of a really pure hunk
of quartz and the careful cutting of it. The quartz slab has to be carefully
mounted so that the supporting wires don't influence the performance too much.
It has to be sealed in a really clean enclosure. The electronics has to be
designed so that the xtal gets just the right level of feedback, and that the
feedback level is stable. And you have to control its temperature very closely.

The range of xtal performance that we see is the result of many factors. As I
said before, if someone can find a better xtal than the Rakon, please let me
know!

> An average quality TCXO (0,1 ppm) could have a 1000 seconds drift much
> in excess of the Oncores

The 0.1 PPM value that is usually quoted refers to long-term stability (days
to weeks). Most xtals are much better at shorter times. That's why I asked
you to look at the typical Allan Variance curves I've compiled at URL
    ftp://aleph.gsfc.nasa.gov/GPS/tapr_dcc/allanv.gif (or .jpg or .ps)
where you will see I show ~1:10e7 at 1 day for what I call a "good, cheap" xtal
(like the Rakon). Rakon's catalog specifies < 1:10e9 @ 1 second but
it is really better than that. On the plot, you will see that the GPS &
cheap xtal are equal at ~100-300 seconds where they are both ~1:10e10.

> per-second-level : (1.10e-7 . 10e+11) >> ~ +/- 130.
>
> But even a labquality OCXO (I can buy one out here, KVG brand,
> at DFls 900 ~ US.$. 440 , 10 Mhz, standard off the shelf, 5pp10e10/degrC
> (-25-+70degrC) has break even term of only 260 seconds [snip]

I don't know that particular xtal -- but it sounds similar to the units I've
seen here in USA. It might "break" at 260s but I'd bet it is more like 1000s.

John Pringle commented:
> I have two very good oscillators that I picked up at hamfests/surplus sales.
> One is an FTS-1000 5MHz standard that has a long-term stability of
> <1x10e-10/day and a short-term stability (Allan variance) of <1x10e-12 for 1
> to 100 seconds. The other unit is an HP-10544A 10 MHz standard that has a
> long-term stability of <5x10e-10/day and a short-term stability of
> <2x10e-11 for 100 seconds. Both oscillators can be "disciplined" with a DC
> control voltage to phase-lock them to a secondary standard. My goal is to
> build the best frequency/time standard that I possibly can utilizing one or
> both of these units and the upcoming TAPR TOC board to lock them to GPS. You
> have already convinced me that I should replace my Garmin GPS-20 with a
> Motorola ONCORE VP which I will order from TAPR when the TOC project gets
> rolling.

Your "luck" in finding good xtals is similar to mine -- I have a number on
the shelf, including a couple of Ball/Efratom Rubidiums. My personal desire
has been to do the "best possible" TOC, but, as you could read in my earlier

notes, if the cheaper/simpler analog unit works out, I think it will be more
"popular" to the bulk of the users.

Glad I convinced you that the G-20 is a toy!

> Here are my questions for the moment:
>
> (1) Will the ONCORE VP directly replace the GPS-20 on the TAPR TAC interface
> board?

Yes -- the ONCORE plugs in directly into the 10-pin connector on the bottom.
All you will have to do is to change one jumper (JP3) as covered in the
TAC-2 notes. When you make the change, you will need to make a configuration
change in Rick's TAC32 by hitting [Data] [Serial] and selecting either
Search or one of the Motorola options.

> (2) Will the design of the TOC furnish the DC control voltage to steer the
> oscillators into phase-lock? I am not quite sure how the TOC will discipline
> the local standards. How will this be done?

Yes, I've always assumed that the xtal can be tuned with a [0-5v] DC control
signal. The tuning sense (does a + voltage raise or lower the freq?) will be
determined by a "set it once" jumper.
>
> (3) Should I be building dividers to divide the 5MHz and 10MHz standards
> down to 1 PPS? Will the TOC compare these with the 1 PPS from the GPS
> receiver and furnish a correction voltage or will there be some other
> phase-locking arrangement?

Either the analog or digital TOC will have its own divider chain built in,
and will be able to take either 5 or 10 MHz. I think it will actually
any integral MHz from 1 to 16, and any half-MHz from 500 kHz to 7.5 MHz.

I'm planning that there will be a small second microstrip board that will
allow a number of different "crystal calibrator" spacings from 10 kHz to
1 MHz. I have a nice little pulse generator design that makes harmonics
that can be easily heard all the way to S-band (and maybe even to C- or
X-band for the coarser spacing). Don't know for sure, but this will probably
be an optional add-on.

If you have a 10 MHz xtal, the TOC will also output 20 MHz. For those of
you with Kenwood radios (like the TS850/950) or the IC706, they use a 20.000
MHz reference oscillator for all the synthesizers in the radio.

Hope that covers all the questions.

73, Tom

123. Oncore VP models [was: DGPS REF STA vs. US COAST GUARD]

From: "Steven R. Bible" <srbible@gate.net>
Date: Fri, 27 Mar 1998 07:15:55 -0500
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19980327071555.007c7e30@pop.gate.net>
Rendered body type: text/plain

>Please check again, Tom. I'm told that TAPR is shipping the
>B8121Z1156 board which is the newer version of the B4121P115x VP
>Oncore. According to the data sheet from Synergy Systems, Tech Note
>310, this model now has raw data output and one of the feature codes
>is CP, carrier phase!

This is correct. Motorola is throwing in the whole kitchen sink in its
lastest line of Oncore VP's. We use to sell the B4121P1155 and now we are
selling the B8121Z1156. This unit has 1PPS and Carrier Phase but no
battery backup and straight OCX connector.

>Well, if the new TAPR provided VP Oncores have carrier phase raw data
>output (see above) then we really need affordable post processing
>software that can use carrier phase for really accurate location
>fixes in a reasonably short amount of time.

Are you volunteering to write the program?

 - Steve, N7HPR
 (n7hpr@tapr.org)

124. Re: [TACGPS:1212] Re: TOC comments

From: Lyle Johnson <lylej@azstarnet.com>
Date: Fri, 27 Mar 1998 07:17:06 -0700
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980327071706.00871100@pop.azstarnet.com>
Rendered body type: text/plain

>Brian Mullaney commented:
>> Which brings up a question - Do you know if the various OEM boards from
>> Ashtech are any good? The data sheets claim good numbers, when you compare
>> them to (at least) the Garmin boards:
>>
>> Ashtech (data sheet #s)
>> G8 1PPS +/- 1usec

This is a basic receiver and I don't recall that it has a position fix mode. I have some conflicting data on it, and have no good way (yet) to measure this.

>> G12 1PPS +/- 200nsec

If you get this with the base station options, it has position fix mode and a pretty low noise RF system. I'd expect it to be very good. But, in small qty with this oiption you're looking at roughly $3.5K. I have one of these to measure, but can't do it until I have the TOC :-)

>> GG24 1PPS +/- 70nsec (GLONASS + GPS board)

This is even more expensive. We have been using the GG-24 RTK systems at work for some time now (I know, they were just announced a few weeks ago, we've been working with Ashtech on this for well over a year). All our units have the base station option, so I don't know if the "rover" configuration is required. This is lots more money than the G12.

And there is also the Micro-Z. This is an L1/L2 system, same Eurocard format as the GG24 except the board is 0.093" thick rather than 0.062" and is really stuffed with parts! The pilot units just ca,me off the line a few eeks ago. It is even more expnsive than the GG24...

>> I haven't called to find out how much the eval kits are (no money) :-(

G8 eval kit is $995.

And then there is the SK8 and the ACE from Trimble... But in the end I think only the VP Oncore has been really tuned for timing applications (and the UT+ Oncore) (opinion, not based on measurements).

73,

Lyle

125. DGPS Ref Sta WORKS

From: Boyd Prestwood <w2hob@mosquito.com>
Date: Fri, 27 Mar 1998 23:29:18 -0500
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19980327232918.006c4d48@mail.mosquito.com>
Rendered body type: text/plain

To the group...

Received my DGPS Ref Sta from TAPR via UPS this afternoon at 2:30pm and I had it up and working just before 6pm... not hooked to any TNCs or radios but it does what the book says it will do... Used TAC32 to initiate it and I can see the gobbletygook on the datalink output.

Did not find any glitches or gotchas in the assembly manual. It went together like the docs said it should. Nice job N7HPR and KC3RL... now to get it in a chassis and attach it to a TNC. I am considering a MIM... any forseeable problems with this? It doesn't need to hear & decode 2m. The MIM just needs to hear enough to rectify the audio for a hold-off logic so as not to transmit in the blind as I see it.

Also, could someone explain the necessity of the ID for the Ref Sta 0-1023? Is this just an arbitrary number selected by station operator for some oddball purpose? I am assuming it has nothing to do with the ham call...

Again... thanks guys... pretty nifty so far!

73 de Boyd W2HOB in NJ
w2hob@mosquito.com

126. Re: Oncore VP gps rcvr

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Sat, 28 Mar 1998 04:45:36 +0000
To: Byron Smith <wa6ylb@theworks.com>
Cc: TACGPS <tacgps@tapr.org>
Message-ID: <351C8070.54706EA1@clark.net>
Rendered body type: text/plain

Byron Smith (WA6YLB) asked:
>
> I see, with great interest, the TAPR DGPS correction board. Question. Do
> you know if any other kind of GPS will drive this DGPS board offered by TAPR?
> What is this board looking for? Some kind of propriety output format?
> Is there any other kind of GPS units, Motorola etc, that will drive the
> TAPR board?

Not that we know of. For a number of years, the Motorola PVT-6 & ONCORE VP
have been capable of generating a proprietary (but well documented) DGPS
signal.
What Steve (N7HPR) did on the TAPR board is to develop a dedicated PIC micro-
controller that converts the proprietary DGPS signals into standard RTCM SC-104
format.

> Do you know if the Oncore VP board includes a active antenna, or not? Is
> there any kind of antenna jack (mcx?) on the Oncore?

There is a picture of the VP board on the TAPR web site (http://www.tapr.org)
along with some spec sheets. The VP is a credit card sized OEM receiver with
only
2 connectors -- an MCX (a.k.a. OSX) antenna port and a 10-pin power+data
header.
So you must supply the antenna, but it's a standard antenna interface
(including
+5VDC bias supplied by the ONCORE to the antenna thru the MCX connector).

73, Tom

127. Re: [TACGPS:1213] Oncore VP models [was: DGPS REF STA vs. US COAST GUARD]

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Sat, 28 Mar 1998 06:18:45 +0000
To: tacgps@tapr.org
Message-ID: <351C9645.E6196BA6@clark.net>
Rendered body type: text/plain

Steve Bible, responding to Ira Wilner, who was responding to me wrote:
>
> >Please check again, Tom. I'm told that TAPR is shipping the
> >B8121Z1156 board which is the newer version of the B4121P115x VP
> >Oncore. According to the data sheet from Synergy Systems, Tech Note
> >310, this model now has raw data output and one of the feature codes
> >is CP, carrier phase!
>
> This is correct. Motorola is throwing in the whole kitchen sink in its
> lastest line of Oncore VP's. We use to sell the B4121P1155 and now we are
> selling the B8121Z1156. This unit has 1PPS and Carrier Phase but no
> battery backup and straight OCX connector.

Ira -- My statement referred to the ONCOREs obtained historically from TAPR.
Up until recently, the ONCOREs supplied by TAPR were B4121P1155. These
units DID NOT have the carrier phase option enabled (I have ten from
that batch at work). As Steve reports, the newest buy is apparently the
version that does include carrier phase (I can't verify this personally
'cuz I have not had my hands on one of the latest boards offered by TAPR).

So, the majority of the people who are on the TACGPS list do not have the
carrier phase version, which is what I intended to imply by my message.

And for Steve, the connector is OSX (a.k.a MCX). And I thought that the
newest batch had the right-angle connector -- if not, I'd recommend that
the NEXT batch have the right-angle connector because it's a lot easier
to interface with.

Tom

128. Re: [TACGPS:1215] DGPS Ref Sta WORKS

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Sat, 28 Mar 1998 06:06:09 +0000
To: tacgps@tapr.org
Message-ID: <351C9351.24077E73@clark.net>
Rendered body type: text/plain

Boyd Prestwood wrote:
> [snip]
> Also, could someone explain the necessity of the ID for the Ref Sta 0-1023?
> Is this just an arbitrary number selected by station operator for some
> oddball purpose? I am assuming it has nothing to do with the ham call...

The DGPS ID is simply a 10-bit number that gets inserted into the
beacon output. The number of the currently active DGPS ID appears,
along with the DGPS data age, at the tail-end of the $GPGGA NMEA
message generated by the "slave" receiver.

W3IWI-13 DGPS beacon has historically used 0073 for obvious reasons.

73, Tom

129. Re: [TACGPS:1217] Re: Oncore VP models

From: "Steven R. Bible" <srbible@gate.net>
Date: Sat, 28 Mar 1998 01:47:23 -0500
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19980328014723.007c1520@pop.gate.net>
Rendered body type: text/plain

>And for Steve, the connector is OSX (a.k.a MCX). And I thought that the
>newest batch had the right-angle connector -- if not, I'd recommend that
>the NEXT batch have the right-angle connector because it's a lot easier
>to interface with.

Tom, I am researching this now. The model with the right angle OSX
connector also has the battery backup. I also think people would like the
battery back up option. This model is generally $10.00 more. Let me see
what I can work out.

- Steve, N7HPR
(n7hpr@tapr.org)

130. Re: [TACGPS:1218] Re: DGPS Ref Sta WORKS

From: "Steven R. Bible" <srbible@gate.net>
Date: Sat, 28 Mar 1998 01:59:12 -0500
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19980328015912.008259f0@pop.gate.net>
Rendered body type: text/plain

At 03:34 AM 3/28/98 -0600, you wrote:
>Boyd Prestwood wrote:
>> [snip]
>> Also, could someone explain the necessity of the ID for the Ref Sta 0-1023?
>> Is this just an arbitrary number selected by station operator for some
>> oddball purpose? I am assuming it has nothing to do with the ham call...

Tom mentioned...
>The DGPS ID is simply a 10-bit number that gets inserted into the
>beacon output. The number of the currently active DGPS ID appears,
>along with the DGPS data age, at the tail-end of the $GPGGA NMEA
>message generated by the "slave" receiver.
>
>W3IWI-13 DGPS beacon has historically used 0073 for obvious reasons.

To add a little, the RTCM specification says about Station ID:

  "Station ID is arbitrary, and set by the reference station provider."

Realize that the RTCM SC-104 specification is a stand alone protocol. It
does not need packet radio to carry it around. So we are sort of dual
wrapping the corrections data. The RTCM spec has a preamble and parity
words. The USCG transmits the corrections on a LF beacon frequency
(285-310 KHz) modulated MSK. These signals are determined good if the
parity words check. As for our packet AX.25, there is a CRC check for the
whole packet. So you see, dual wrappers.

So if for example you own a USCG beacon receiver, you can see what the Station ID is and in turn determine which of the many USCG beacon stations you are receiving. As for us, the Station ID is a number 0-1023. Not enough information to put a ham callsign. So in order for us to id, we need the AX.25 packet or we'll have to CW id. As Tom mentioned, you can see the Station ID in the $GPGGA NMEA sentence. TAC32 and Showtime will display this number for you. And Stan Huntting, KW7KW, the writer of SA Watch is putting it in his next release.

I can see that as more and more DGPS reference stations go up, we need to put in a station id only to differentiate between reference stations. We have no idea what will happen if a ham receives two beacon signals, from two different reference stations on the same ham frequency.

As for distance from the reference station. Accuracy will drop off sharply outside of 100 Km. This is the distance the USCG uses for its beacons. So as hams put up reference stations, they need to coordinate 100 Km radius'.

 - Steve, N7HPR
 (n7hpr@tapr.org)

131. Re: [TACGPS:1219] Re: Oncore VP models

From: "Ira A. Wilner" <bdcst@vermontel.com>
Date: Sat, 28 Mar 1998 14:16:19 -0500
To: "Steven R. Bible" <srbible@gate.net>, tacgps@tapr.org
Message-ID: <199803281912.OAA00586@eureka.vermontel.com>
Rendered body type: text/plain

> Tom, I am researching this now. The model with the right angle OSX
> connector also has the battery backup. I also think people would like the
> battery back up option. This model is generally $10.00 more. Let me see
> what I can work out.
>
>
>
> - Steve, N7HPR
> (n7hpr@tapr.org)

Steve,

According to my information from Art Sepin (Synergy Systems) the model B8221Z1116 Oncore VP has the right angle OSX socket and backup battery for only $2 more than the present model you are selling!

This is the card TAPR should buy instead of the B8121Z1156.

Let me know if you decide to order a batch and count me in for one.

--Ira, W1IRA

132. TOC comments

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Sun, 29 Mar 1998 09:41:52 -0500
To: "TAC-2 mail list" <tacgps@tapr.org>
Message-ID: <003801bd5b20$dbf094a0$481f5c18@john.tampabay.rr.com>
Rendered body type: text/plain

Tom Van Baak wrote:

>Yes, the FTS1200 is really nice. If you don't mind,
>how much did you pay for it?

>Thanks,
>/tvb

Tom -- About 3 years ago I was going through some "junk" crates under a table at a hamfest. I spotted the FTS-1000 and it looked to be in excellent health. I offered the table proprietor $50 for it. He obviously didn't know its value and said he had picked it up at a surplus auction with a lot of other stuff and "would being taking advantage of me if he sold it for $50"! My second offer was $35 which he gladly accepted. I couldn't wait to get home to see if it really worked. To make a long story short, it has been running continuously for 3 years and apparently is as good as new. Can't wait to get it working with the forthcoming TOC and discipline it to GPS. I am generally not so lucky, but that day 3 years ago was my lucky day.

73, John

133. Re: [TACGPS:1203] Re: gps-20 or oncore ?

From: Jeff Vollin <barnie@flash.net>
Date: Sun, 29 Mar 1998 11:42:58 -0700
To: tacgps@tapr.org
Message-ID: <351E9631.3F7544F8@flash.net>
Rendered body type: text/plain

For my purposes, the lower cost, lower performance would be the winner. I expect
my funding manager ;)
would just not approve a $600 oscillator. [Tell me again, dear, just what will an
'oscillator' do for us?]

Jeff Vollin, KC6WFU

Tom Wrote:

> I would like to ask the TACGPSers who want a TOC just what price/performance
> level you need. A level of 1:10e9 means that if you use the clock as the
> time base for a counter, it will be accurate at a level ~1 Hz at 1 GHz. If
> such a widget cost ~$100-$200, are you interested? Or if we do the more
> elaborate
> TOC (including a better xtal), you might get a factor of 10-100 better
> performance,
> but it might cost $500-$600 -- is this of more interest? How good do you
> really need/want? (An off-the-shelf HP58503 costs ~$5000).
>
> 73, Tom

134. Re: [TACGPS:1223] Re: gps-20 or oncore ?

From: Bob Bruninga <bruninga@nadn.navy.mil>
Date: Sun, 29 Mar 1998 14:33:50 -0500 (EST)
To: tacgps@tapr.org
Message-ID: <Pine.SOL.3.96.980329143246.22917C-100000@arctic>
Rendered body type: text/plain

What is the going rate on the GPS-20's?. I still have a box of original
ones from TAPR (6 left, I think) that I need to get rid of. ANyone
interested?

 On Sun, 29 Mar 1998, Jeff Vollin wrote:

> For my purposes, the lower cost, lower performance would be the winner. I expect
> my funding manager ;)
> would just not approve a $600 oscillator. [Tell me again, dear, just what will an
> 'oscillator' do for us?]
>
> Jeff Vollin, KC6WFU
>
>
> Tom Wrote:
>
> > I would like to ask the TACGPSers who want a TOC just what price/performance
> > level you need. A level of 1:10e9 means that if you use the clock as the
> > time base for a counter, it will be accurate at a level ~1 Hz at 1 GHz. If
> > such a widget cost ~$100-$200, are you interested? Or if we do the more
> > elaborate
> > TOC (including a better xtal), you might get a factor of 10-100 better
> > performance,
> > but it might cost $500-$600 -- is this of more interest? How good do you
> > really need/want? (An off-the-shelf HP58503 costs ~$5000).
> >
> > 73, Tom
>
>
>
>

APRSdos REPLY/COMMENT:

Reply mail addr: wb4apr@amsat.org
US mail address: 115 old Farm Ct, Glen Burnie, MD 21060
See DAYTON97 HISTORY: http://web.usna.navy.mil/~bruninga/dayton.html
See Maryland APRS LIVE: http://web.usna.navy.mil/~bruninga/aprs.html
See GPS on ANY radio: http://www.tapr.org/tapr/html/mic-e.html

135. Re: [TACGPS:1224] Re: gps-20 or oncore ?

From: Guy Lopes <guylopes@cwo.com>
Date: Sun, 29 Mar 1998 21:01:43 -0800
To: tacgps@tapr.org
Message-ID: <199803300504.VAA03616@mail.cwo.com>
Rendered body type: text/plain

At 13:38 3/29/98 -0600, you wrote:
>What is the going rate on the GPS-20's?. I still have a box of original
>ones from TAPR (6 left, I think) that I need to get rid of. ANyone
>interested?
>

YES! How much are you asking?

Guy Lopes
Guy Lopes
Securaplane Technologies
Western Region Marketing Manager
ph/fax (916) 686-6916

136. Re: [TACGPS:1212] Re: TOC comments

From: mdmiller@onramp.net
Date: Sun, 29 Mar 1998 17:17:52 -0600
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980329171752.007e9270@199.1.11.3>
Rendered body type: text/plain

I would like to see the TOC be a 1E-10 unit but cost is a concern. I would
think that if the price were under $500 it would be a hit.

I was wondering if anyone on the TOC committee (TOM) had look at Isotemp
http://www.isotemp.com and/or Oak Frequency Control http://www.ofc.com/ ?
I have had the opportunity to use both vendors products in an application
similar to TOC.   I do not know about how either company would handle
pricing for TAPR, but I wanted to throw out these manufacturer's names.
The ISOTEMP product I have used is the model OCX082-59. Off the top of my
head it has temp stability in the neighborhood of 30 ppb I do not recall
the short term stability, but the 1 yr aging is 1PPM. I will have to look
at what specific Oak oscillator I have used and its specifications.

The problem here seems to be the classic marketing problem; Finding the
requirements and making a product that someone will buy.

For myself I would welcome a product with 1E-9 accuracy for my HF rig. The
problem is that I have a Kenwood TS680S with a reference frequency of 36
Mhz and stability of 10PPM. Anything would be an improvement. I have not
been able to find a suitable replacement for the reference.

So what I am suggesting is continuing the survey Tom has begun and continue
to find what type of TOC applications Hams are interested in.

Mark Miller
N5RFX

137. Testing the DGPS stations RTCM output

From: Robert Winingham <kc5ejk@onramp.net>
Date: Mon, 30 Mar 1998 11:57:18 -0600
To: tacgps@tapr.org
Message-ID: <v03102800b1458c31b880@[206.50.200.4]>
Rendered body type: text/plain

I wanted a way to test the DGPS reference stations DGPS output
and came across two possible ways to test the data.

1. Using the NMEA data from a second GPS unit.

2. A DOS program, I found on the NET from DCI, called rtcmon.exe
   that can read the RTCM format
   http://www.dgps.com/rtcmon.ZIP

As Tom posted, the RTCM ID is in the GGA data. Here is the format:

         GGA NMEA output from a GPS without a RTCM DGPS input

  GGA,123519,4807.038,N,01131.324,E,1,08,0.9,545.4,M,46.9,M, , *42
           123519   Fix taken at 12:35:19 UTC
           4807.038,N   Latitude 48 deg 07.038' N

```
           01131.324,E  Longitude 11 deg 31.324' E
           1            Fix quality: 0 = invalid
                                     1 = GPS fix
                                     2 = DGPS fix
           08           Number of satellites being tracked
           0.9          Horizontal dilution of position
           545.4,M      Altitude, Metres, above mean sea level
           46.9,M       Height of geoid (mean sea level) above WGS84
                        ellipsoid
          (empty field) time in seconds since last DGPS update
          (empty field) DGPS station ID number
                                checksum

GGA NMEA output from my Garmin-45 GPS with a RTCM DGPS input:

$GPGGA,003702,3250.776,N,09645.727,W,2,04,2.6,234.4,M,-24.8,M,14,1021*7E
                                     -                         -- ----
                                  DGPS FIX                  time ID



This is a sample output from the rtcmon.exe dos program from DCI
----------------------------------------
Received Type  1 at 2268.6 sec. (Len  9)
 SV  UDRE  IODE    PRC (m)    RRC (m/s)
 17    0    155     72.28      0.052
 23    0    200     -4.56      0.234
 26    0    156     -8.98     -0.208
  9    0     80     -6.70      0.048
  3    0     53    -65.96     -0.130
----------------------------------------


There is a Win-95 program at the same URL but I did not try using it

73

Bob - Dallas,TX ---  kc5ejk@onramp.net  or  kc5ejk@amsat.org  ---
```

138. Re: [TACGPS:1227] Testing the DGPS stations RTCM output

From: "Steven R. Bible" <srbible@gate.net>
Date: Mon, 30 Mar 1998 18:27:16 -0500
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19980330182716.0081d6d0@pop.gate.net>
Rendered body type: text/plain

```
At 12:06 PM 3/30/98 -0600, you wrote:
>I wanted a way to test the DGPS reference stations DGPS output
>and came across two possible ways to test the data.
>
>1. Using the NMEA data from a second GPS unit.
>
>2. A DOS program, I found on the NET from DCI, called rtcmon.exe
>   that can read the RTCM format
>   http://www.dgps.com/rtcmon.ZIP

Bob, thanks for this info.  I'll go give these programs a try.  I have also
programmed a microcontroller to decode the RTCM Type 1 message.  Tom had
ask for a RTCM Ohmmeter, as he called it :-).  I thought that the
microcontroller could be used in a number of applications:

1.  Remote monitoring - to let the remote user in his mobile know that he's
receiving DGPS corrections.  This would be good for those stand alone
trackers that do not have a display (for example, the Garmin GPS-20).

2.  Provider remote monitoring - I thought those who set up a reference
station would like to remotely monitor the health of the RefSta.  I could
add a pizo alarm to buzz when corrections fail.  The pizo could also be
used in (1.) above, to warn that DGPS corrections have been lost.  I got
this idea from my Garmin 45, as it beeps when RTCM corrections are lost.

3.  Garmin Filter - I am also working to filter out the header information
to the RTCM packet as Garmin's won't work with it.  My PacComm PicoPacket
can turn off the header info with the command ADRDISP OFF.  But TNC-2's,
for example, do not have this command.

4.  Data Logging - Presently the microcontroller outputs the RTCM data in
comma delimited format for data logging purposes.
```

5. LCD Display - could be added to any of the above, thus not needing a
computer.

If these ideas appeal to anyone, I'd love to hear from you. Also, if you
have other ideas to try. I feel I have a solution but no problem to solve
:-).

 - Steve, N7HPR
 (n7hpr@tapr.org)

139. DGPS station build notes

From: Robert Winingham <kc5ejk@onramp.net>
Date: Tue, 31 Mar 1998 01:10:49 -0600
To: tacgps@tapr.org
Message-ID: <v03102800b146360c2503@[206.50.200.223]>
Rendered body type: text/plain

DGPS Reference station build notes:

Thanks to the design team. That was a great Manual and easy to use.
I had no problems.

I have a few picky items you might want to update for the
next revision.

Page 5 of 11
----
1. The graph of the Differential Male connector pins
    is a DE9P not a DE9S

2. The Location of the Diff out wire location on the DGPSIB is very
   hard to see on the pictures and the wrong hole might be used when
   connecting the wire to the PCB.

There are three holes in the same area and the white arrow
tip that points to the correct hole had other graphics that
almost mask the arrow tip and it might be overlooked.

I checked the JPEG picture on the TAPR site but that did not
have the detail to see which hole was used. I figured that pin 7
of the MAX232 chip might be the correct output signal.

NOTE: There are not many parts on this board but a circuit diagram
      would help for a double check. Who know, there may even be some
      left over ports on the MAX-232 chip for some other use   :-)

Page 7 of 11

An easy to find item for the optional threaded standoff are the hex
chassy mounting hardware common to the DB25 or DE9 connectors we use in
our home computers and cables. You will need them for mounting the
data connectors, so just get 4 extras.

Page 10 of 11

Lon/Lat position.
I never remember if + is North or South, so how about a short table here.
--- I had the same problem with the TAC-2 kit build ----

```
+  | -     +  |  -
------   ---------
N  | S     E  |  W
```

Page 11 of 11
----
1. The example of the TNC commands for Btext uses DD and LLL for degrees
   whereas the example on page 10 uses LL and LLL (Lower case). Better to
   keep the same symbol. Most all APRS documentation uses the DD.

2. You might want to define the function of the TNC command so we can
   match to different TNCs that may have a different command.

   BEA 120   Is a beacon every 1200 sec (20 Mins) on my tnc.

```
   PACTIME A 10 as I recall will xmit/flush the output buffer 1 sec
                after the last data input, IF no CRLF (return) is detected.

   BTEXT        The first character is the APRS MAP display symbol
                ! in the example given in the Manual.
  It might be nice to have one designated for DGPS. I tried one
  that used the ? and it displayed a tower with a POS underneath.
  The APRS icon list called it a position server.

COMMAND mode:

 I don't know Which is BETTER, to use TRANS mode or CONV  ??
When I tested them , CONV did an echo and TRANS did not.

I did use the remote login feature of my KPC-3 to set to TRANS mode.
I learned from using a GPS tracker TNC setups to disallow any callsign
connection to a KPC TNC.

-------- the BOX -------------
I used one of those A-B RS-232 metal swithch boxes you alwasy see at the
sidewalk swap meets for a container. The DE-9 or RJ-11 ones work best as
most of the holes will already be there.

--------- The software -------
The Mac users will be happy to know that TAC32 under Virtual PC will program
the DGPS unit just fine. ( Thanks to the latest version where not having a
one PPS on the DCD line won't cause a problem)



73


Bob - Dallas,TX ---  kc5ejk@onramp.net  or  kc5ejk@amsat.org  ---
```

140. DGPS build notes follow up

```
From: Robert Winingham <kc5ejk@onramp.net>
Date: Tue, 31 Mar 1998 01:13:36 -0600
To: tacgps@tapr.org
Message-ID: <v03102801b1464156cc1c@[206.50.200.223]>
Rendered body type: text/plain
```

```
DGPS build notes :

Follow up items:

We need a reference document or URL to send to Hams who see the data from
our DGPS station and want to know how to use the data with their GPS.

1. What GPS will give what results.

2. The TNC output is RS-232 and Garmin GPS and others are TTL input.
   I have not had a problem using a direct connection. ( YET).

3. The item in the manual about the GARMIN units having a problem with
   the TNC address was a MAJOR ZINGER. There are a lot of Garmin units out there
   and few will know this is a problem or how to work around.

4.  we need a list of commands for other TNC units that do the same as the PacComm
    ADRDISP OFF or do we say --IF you have a Garmin you MUST only use PicoPacket TNC -- ?

I can test the KPC3, KPC3+, PK12 and the PK96 but I don't find a ADRDISP like command.

     What if we turn HEADLN ON which puts the  address and data on separate
     lines, will that fix the problem ?

Other Items for BBS discussion:
-------------------------------
1. Station ID - I see this had been addressed yesterday, but we need to know if the
   same ID in the local area will impact the DGPS correction

2. Align Messages option in TAC32. Make the DGPS RTCM data output start on the
   min. Seems like a good idea. Makes it easy to listen and tell if it is the
   DPGS station that just went brreeeep. I think only picoPacket GPS trackers
   set/update the TNC clock with the GPS NMEA data. APRS has so many back off
   timers I would think collisions would not be a problem.

73
```

Bob - Dallas,TX --- kc5ejk@onramp.net or kc5ejk@amsat.org ---

141. Fun with TAC

From: Steve Sampson <ssampson@access.usa-site.net>
Date: Tue, 31 Mar 1998 19:39:19 -0600
To: tacgps@tapr.org
Message-ID: <35219AC7.9FF31AEC@access.usa-site.net>
Rendered body type: text/plain

I spent Sunday (off and on) soldering up the kit. I found the instructions adequite,
except on page 5 where after installing two resistors, it says to clip 6 leads??

On Page 7 the P4 needs to be highlighted better, as going on the bottom. J1

below it, is done much better.

On Page 19, the note on J3 says Oncore uses I setting, but on Page 13 it says
to use N. Also, there is no trace between pins 1 and 2 (I) to scratch off, but
there is between 2 and 3 (N).

I fired the thing up with the Oncore and the LED blinks nicely. Tryed Showtime, and got
some beeps and then nothing. It stalled looking for data at 9600. I swapped out the
Max 232, same thing. Then I swapped J3 from N position to I position. Showtime
says no DCD now?? Typed Y at the prompt, and the clock came up with GPS
data. Tryed SA Watch and everything seems normal in I position, nothing in N.
Tryed TAC32 software, and nothing works.

Questions:

1. Why would J3 have any effect on DCD?
2. Is TAC32 looking for inverted signals?
3. Any thoughts on what is causing DCD problem?

Thanks,

Steve

Robert Winingham wrote:

> I wanted a way to test the DGPS reference stations DGPS output
> and came across two possible ways to test the data.
>
> 1. Using the NMEA data from a second GPS unit.
>
> 2. A DOS program, I found on the NET from DCI, called rtcmon.exe
>   that can read the RTCM format
>   http://www.dgps.com/rtcmon.ZIP
>
> ------------------
> As Tom posted, the RTCM ID is in the GGA data. Here is the format:
>
>   GGA NMEA output from a GPS without a RTCM DGPS input
>
>   GGA,123519,4807.038,N,01131.324,E,1,08,0.9,545.4,M,46.9,M, , *42
>   123519   Fix taken at 12:35:19 UTC
>   4807.038,N   Latitude 48 deg 07.038' N
>   01131.324,E Longitude 11 deg 31.324' E
>   1   Fix quality: 0 = invalid
>   1 = GPS fix
>   2 = DGPS fix
>   08   Number of satellites being tracked
>   0.9   Horizontal dilution of position
>   545.4,M   Altitude, Metres, above mean sea level
>   46.9,M   Height of geoid (mean sea level) above WGS84
>   ellipsoid
>   (empty field) time in seconds since last DGPS update
>   (empty field) DGPS station ID number
>   checksum
>

```
> GGA NMEA output from my Garmin-45 GPS with a RTCM DGPS input:
>
> $GPGGA,003702,3250.776,N,09645.727,W,2,04,2.6,234.4,M,-24.8,M,14,1021*7E
>                                      -                      -- ----
>                                   DGPS FIX                 time ID
>
> This is a sample output from the rtcmon.exe dos program from DCI
> ----------------------------------------
> Received Type  1 at 2268.6 sec. (Len  9)
>  SV  UDRE  IODE    PRC (m)    RRC (m/s)
>  17    0    155     72.28      0.052
>  23    0    200     -4.56      0.234
>  26    0    156     -8.98     -0.208
>   9    0     80     -6.70      0.048
>   3    0     53    -65.96     -0.130
> ----------------------------------------
>
> There is a Win-95 program at the same URL but I did not try using it
>
> 73
>
> Bob - Dallas,TX ---  kc5ejk@onramp.net  or  kc5ejk@amsat.org  ---
```

142. Re: [TACGPS:1231] J3 - Jumper

From: gregory.beat@mediaone.net
Date: Tue, 31 Mar 1998 22:34:47 -0600
To: <tacgps@tapr.org>
Message-ID: <002f01bd5d27$81554a00$1a968318@beatgr.ce.mediaone.net>
Rendered body type: text/plain

Steve,

When TAC-2 is used with the Oncore VP GPS the receiver's signal is inverted, so you need to have the J3 (TXD POL) jumper correctly pinned for I (Inverted) - between pins 1 and 2 on J3.

I believe that you still need to "cut" or "break" the copper trace between pin 2 and pin 3 (normal) at J3. The instructions for this procedure may be incorrect or unclear (this was reported earlier).

Best of luck

G. Beat
W9GB

143. Re: GPS velocity from Doppler measurements

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Wed, 01 Apr 1998 04:34:03 +0100
To: Ken McGuire <mcguire.ken.e@sd.littondsd.com>
Cc: TACGPS <tacgps@tapr.org>
Message-ID: <3521B5AB.FB705E5C@clark.net>
Rendered body type: text/plain

Ken McGuire, WA2VFN wrote:
>
> Tom,
> I am having a "discussion" with an associate regarding GPS velocity
> accuracy. I don't have the depth of knowledge necessary to refute
> the following statement.
>
> "It is true that many of the receivers use the doppler for velocity
> determination, however it is well recognized in the GPS community that
> this velocity information is good only for users that have very low
> dynamics; like docking ships, and that once the velocity increases and
> if there is any acceleration at all, the doppler measurement become
> unusable. Basically the doppler information is only good for
> smoothing the PR's when there is velocity and/or accelerations. This
> is called integrated carrier measurements. "

The time-rate-of-change of the carrier phase >>IS<< (essentially) the doppler (if you subtract out the fact that the rcvr's LO is not on frequency perfectly). And yes, it is the "doppler" that is used to measure velocities.

Most receivers have their carrier PLL's tuned to allow changes in velocity (i.e. accelerations) ~2-3G without losing lock. The velocity itself is pretty much irrelevant. Even if you are stopped, the satellites have an orbital velocity ~7 km/sec (which projects as ~4 km/sec to an observer on the ground), and the earth is rotating at

a speed of 400 m/sec at the equator (times cosine(latitude) for you).
So ANY receiver must have a doppler tracking range of nearly +/- 5
km/sec = +/- 18,000 km/hr = +/- 12,000 MPH! Any speed you add because
you are moving in a car is essentially irrelevant in terms of the
rcvr's tracking range!

[Aside: In talking about speeds, there is one additional "clamp" limit
imposed on your rcvr. The "Anti-Scud" COCOM rule stipulates that
any rcvr that can operate at a speed > Mach 2 while at an altitude
above 60,000 ft must be treated as a munition. Some rcvrs (Trimble)
interpret the 2 conditions with "OR" logic; when a Trimble flies
in a balloon to 100,000 ft, it's rcvr does a hard reset to Sunnyvale
when it passes thru 60,000 ft. Other rcvrs (Motorola ONCORE and
Collins/Rockwell Jupiter for two) do the complete logic test and
work fin in slow-moving balloons.]

The acceleration allowed by the carrier phase PLL is determined by
the manufacturer. Quite often he will limit it to be < 1 radian of
phase glitch in 1 msec of time. Since <1 radian means <3 cm in 1 msec,
this becomes an acceleration of <30 meters/s/s -- i.e. <3g. Depending
on the desires of your rcvr's manufacturer, your mileage may vary.

Each manufacturer uses their own buzz-words to describe the way that
they do the PVT (position,velocity,time) solution. Consider that your
rcvr is running in 3-D mode. It must track (i.e. it is getting
pseudo-ranges=PR from the C/A code) at least 4 satellites to have
a solution for the 3 positional unknowns plus the clock offset of
the rcvr's clock. Similarly, the minimal solution for 3-D velocity
also requires 4 satellites -- 3 components of velocity (i.e. Doppler
shift) and one to get the frequency offset of the clock (i.e. the
rcvr's local oscillator).

The carrier phase is a more precise observable than the C/A code --
the carrier phase changes by 360 deg = 1 cycle each time the geometry
changes by 19 cm = one wavelength at 1575.42 MHz. The C/A code phase
is at a rate of 1.023 Mb/s, for a wavelength ~300 meters. Therefore
a 19 cm/sec (about .5 MPH) motion in the direction of a particular satellite
shows up as a 1 Hz Doppler shift. To see a slow motion
like this in the C/A code would be difficult to see unless you wait
a minute or two, but it shows up right away in the Doppler-determined
velocity. So most manufacturers use the time-rate-of-change of
carrier phase (related to the changes in Doppler) as a way to
interpolate between the coarser positions. This is what is called
"carrier phase smoothing".

In the real world of more modern receivers, more than 4 satellites
are tracked, so there are more than 4 PR and PRR observables. Most
receivers feed in the C/A code PR's and the carrier phase data into
a single analytic black box (BB) in the rcvr's microprocessor. The
BB remembers some number of past PR/PRR measurements and PVT solutions,
combines these with some "magic" weighting coefficients, and the BB
outputs the entire PVT solution to you.

In many rcvrs, the "magic" coefficients are variable and depend on
the past history -- this is often done in a Kalman filter, and each
manufacturer has his own proprietary, magic algorithms. Here is an
experiment I've done many time. I'm driving to work and click on the
rcvr cold. After a while it locks up and it shows me hundreds of
meters from the road. After a minute or two it "chirps" and the
display now shows I'm on the road. This happens faster if there are
a couple of turns involved. And this is because the filter is
setting its coefficients as it tries to minimize the errors in the
combined PVT solution (which, when cold, may be a cycle or two of
the 300 meter C/A code wavelength!). The moral is to not trust a
position until a rcvrs has had a couple of minutes of data in the
filter!

> We are using a Rockwell Jupiter 12ch receiver.
> The Rockwell manual says:
>
> " The Zodiac and other Rockwell receivers compute velocity from the
> carrier loop Doppler information." ... " .. the carrier data is a
> much better source of velocity information than position
> differences."
>
> Can you give me a quick "rule of thumb" to know what I can expect in
> terms of GPS velocity accuracies with SA on, off and with DGPS
> applied?
>

> many thanks
>
> ...73 ken WA2VFN...

The SA modulation involves a PN sequence diddling a "line stretcher"
in the output of each GPS spacecraft's 10.23 MHz atomic clock. The
modulation frequencies involved range from a few seconds to ~1/2 hour.
The DoD has agreed to (and seem to live up to it) to limit the time-
rate-of-change of the carrier phase (i.e. the frequency error) to
something ~1 Hz at L-band (i.e. ~20 cm/sec of velocity error).
The error from one satellite maps into the final solution like HDOP
for the horizontal velocity, and like VDOP for the vertical component.
So velocity errors of 1 Hz = 19 cm/sec = 8 in/sec ~ .5 MPH can be
expected if uncorrected.

"Ahhh." you may say, "When I am stopped at a traffic light, my rcvr
often shows ~1 MPH speed. This is twice what you just said."

Actually these two numbers are not inconsistent! When you are stopped,
your rcvr shows the apparent speed -- not the velocity. A velocity
has a directional sign associated with it, and the speed is just a
scalar number which can never be negative. [For those of you who
understand the statistical arguments, the zero speed will have a
Rayleigh distribution non-zero mean and a long tail. As the car's
speed increases, the distribution tends to a symmetric, 2-sided
Gaussian. At intermediate speeds, you expect a Rice distribution.]

So to answer you question, an uncorrected GPS rcvr will show ~ 20 cm/s
or .5 MPH errors. The DGPS signals can reduce this by a factor of
10-50 depending on the quality of the signals, the update rate, and
on how close you are to the reference station. With the TAPR widget,
both Steve and I have seen the ~100 meter positional uncertainty
get as small as 1-2 meters in controlled zero-baseline tests with
good GPS rcvrs. Your mileage may vary!

Sorry for the long answer to a short question. I'm sending it to
the entire TACGPS list since others may be interested.

73, Tom

cannot be negative

April 1998

Original source file: tacgps.9804
Source: http://ftp.tapr.org/product_docs/TAC2/mail_archives/tacgps.9804

1. Re: [TACGPS:1231] Fun with TAC

From: "Steven R. Bible" <srbible@gate.net>
Date: Wed, 01 Apr 1998 00:03:08 -0500
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19980401000308.00886b70@pop.gate.net>
Rendered body type: text/plain

At 07:44 PM 3/31/98 -0600, you wrote:
>Questions:
>
>1. Why would J3 have any effect on DCD?
>2. Is TAC32 looking for inverted signals?
>3. Any thoughts on what is causing DCD problem?

Steve, it appears that you have an older assembly manual. Is it the Rev 2?
 If not, it can be downloaded from the TAC-2 web page. I'm certain I took
care of all those typos and mistakes.

 - Steve, N7HPR
 (n7hpr@tapr.org)

---

2. Re: [TACGPS:1234] Re: Fun with TAC

From: Steve Sampson <ssampson@access.usa-site.net>
Date: Wed, 01 Apr 1998 06:01:03 -0600
To: tacgps@tapr.org
Message-ID: <35222C7F.E9DA8DAD@access.usa-site.net>
Rendered body type: text/plain

It's dated July 97. I'll download the web version.

Thanks,
Steve

Steven R. Bible wrote:
>
> Steve, it appears that you have an older assembly manual. Is it the Rev 2?
> If not, it can be downloaded from the TAC-2 web page. I'm certain I took
> care of all those typos and mistakes.

---

3. Re: [TACGPS:1232] Re: J3 - Jumper

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Wed, 01 Apr 1998 12:31:33 +0100
To: tacgps@tapr.org
Message-ID: <35222595.18CCA033@clark.net>
Rendered body type: text/plain

Greg Beat said:
> Steve,
>
> When TAC-2 is used with the Oncore VP GPS the receiver's signal is inverted,
> so you need to have the J3 (TXD POL) jumper correctly pinned for I
> (Inverted) - between pins 1 and 2 on J3.
>
> I believe that you still need to "cut" or "break" the copper trace between
> pin 2 and pin 3 (normal) at J3. The instructions for this procedure may be
> incorrect or unclear (this was reported earlier).

Completely correect. The ONCORE produces [I]nverted TTL-level signals. The
Garmin rcvrs and the older Motorola PVT-6 produce [N]on-inverted signals.
JP3 defaults to the [N]on-inverted position due to a silver trace on the
back-side of the board, so for the Garmin rcvrs, you do not need to do
anything. For the ONCORE VP, the trace must be cut and the default jumper
changed.

Steve Bible's reply to Steve Sampson was correct. The JP3 description in the
early documentation was wrong. Last year something got swapped between me (who
designed the PCB and wrote the initial documentation) and the people who
pulled together the documentation that went out with some of the kits. This
error was fixed in the version on http://www.tapr.org. I had to walk some
Japanese thru the same problem last week. SHOWTIME's "oscilloscope" shows

the DCD pulses and then freezes in the INIT @ 4800 9600 steps. TAC32 also checks both the 1PPS DCD signal (as seen in the Red light in the lower-right corner of the screen) as well as trying to establish communications with the rcvr in order to get running. Both require the the resence of both some RS232 serial data and the RS232 DCD 1PPS signal in order to proceed.

To further answer Steve Sampson's questions -- I haven't analyzed the circuit to see what will happen if all 3 pins on JP3 are shorted. The JP3 jumper and the associated inverters have NOTHING to do with the DCD signal. Both sets of computer software want to see both signals at RS232 levels at the PC's serial port. If you want to use a voltmeter to check that it's correct, both signals "idle" at the minus voltage (about -9v) and go positive (to about +9v) for a small fraction of the time.

73, Tom

4. Almanac data for GPS-20

From: Dave Martindale <davem@cs.ubc.ca>
Date: Wed, 1 Apr 1998 23:25:25 -0800
To: tacgps@tapr.org
Message-ID: <l03130300b148ea1ad469@[198.162.38.159]>
Rendered body type: text/plain

A week or two ago, Alan Sanders posted about almanac problems with his GPS-20. I did some experiments with my own, and found that (a) it two about 2 days for the 20 to collect a complete new almanac, and (b) there seemed to be a bug that caused satellites that were once unhealthy to remain marked that way, even if they were in fact OK now.

Partly as a result of that, I upgraded my 20 to a GPS-25 LVC. What a difference! By looking at the initial almanac in the 25 (with no antenna connected, to give me enough time!), I could tell that the 25 had not been operating for the past 10 weeks. Once I connected an antenna and turned on the power again, it took 40 seconds for it to start navigating. I left it running for about 20 minutes, and grabbed another almanac from it. Every entry had been updated. In addition, SV 13 was unhealthy 10 weeks ago, but is now marked as OK again. The new 25 almanac now agrees with my 12XL about which SVs are healthy.

I've included an almanac dump from the 25 below. If anyone has a GPS 20 and wants to update their almanac, it should be sufficient to just send the data below to their board using a terminal emulator. (Note to Mac users: each line has to end with CR-LF, not just CR).

Unfortunately, I can't test this myself. My 25 now resides in the pseudo-TAC box that used to be the 20's home, and I can't just plug the 20 back in due to different serial output voltages. But sending the almanac data below to a GPS 20 *should* be enough to get it to begin using SVs 3, 13, and 19 again.

Dave

```
$GPALM,32,1,01,951,00,222C,90,0890,FD51,A10CC4,BCCC79,E19D38,7E73AF,02E,000*77
$GPALM,32,2,02,951,00,8F82,90,FDB8,FD39,A10CED,A2740C,33F69E,C91B03,E11,FFF*7E
$GPALM,32,3,03,951,00,1042,90,04FA,FD43,A10D25,60C931,5FFEB4,3B3DC4,078,001*7B
$GPALM,32,4,04,951,00,2693,90,1666,FD49,A10D67,DF3EAE,8C01C8,283BC6,015,001*07
$GPALM,32,5,05,951,00,08F8,90,FF97,FD38,A10D1C,F190B6,34AAA2,30562B,097,000*79
$GPALM,32,6,06,951,00,35BE,90,09B4,FD48,A10DBB,96DC5F,6178C5,49017C,000,000*77
$GPALM,32,7,07,951,00,4E7D,90,0B1D,FD4A,A10CF3,A47E78,602379,992588,32B,000*0F
$GPALM,32,8,08,951,00,52E7,90,0A5D,FD48,A10CAF,49EE3D,0C5F4C,ED8461,295,002*0A
$GPALM,32,9,09,951,00,3B67,90,0117,FD3A,A10D29,0D2277,0AF1DE,4216F0,FDA,000*01
$GPALM,32,10,10,951,00,1722,90,0F48,FD47,A10D57,F4A360,B5E11E,CF5073,015,000*44
$GPALM,32,11,11,,,,,,,,,,,,*7A
$GPALM,32,12,12,,,,,,,,,,,,*7A
$GPALM,32,13,13,951,00,101B,90,0B11,FD55,A10E18,BC6670,E096C1,F8AC15,375,FFE*42
$GPALM,32,14,14,951,00,081D,90,12E1,FD4E,A10CC2,7EC201,B7B3D5,9B12FF,01E,000*3E
$GPALM,32,15,15,951,00,399B,90,19CA,FD4C,A10D0D,3FB418,8D9701,0B8420,238,001*3D
$GPALM,32,16,16,951,00,17E9,90,1089,FD4B,A10DAB,00EECC,B7EE50,04CA66,03B,000*40
$GPALM,32,17,17,951,00,4FFC,90,1A97,FD4F,A10CB4,6A906A,8F1CA6,3F3F3D,F46,000*33
$GPALM,32,18,18,951,00,373A,90,017B,FD46,A10D72,455233,DF300C,956E76,00D,000*33
$GPALM,32,19,19,951,00,1F99,90,F65C,FD2E,A10CF4,8A3A34,09075B,258103,198,000*43
$GPALM,32,20,20,,,,,,,,,,,,*7A
$GPALM,32,21,21,951,00,736F,90,0EDB,FD49,A10D0F,8D2418,B62145,D99A8B,022,001*4F
$GPALM,32,22,22,951,00,57FB,90,FDA7,FD35,A10CF5,0CCCD4,348D13,C134B7,000,000*32
$GPALM,32,23,23,951,00,686F,90,10E3,FD4D,A10D5D,ACAA02,B7B195,CF70C9,00C,000*41
$GPALM,32,24,24,951,00,420B,90,1CD1,FD50,A10C90,B6256E,8C2DA0,39C3D6,364,002*47
$GPALM,32,25,25,951,00,3932,90,FC72,FD36,A10D71,97AF92,09909B,6E790E,FF9,000*38
$GPALM,32,26,26,951,00,5503,90,0A82,FD55,A10CA7,F540E4,E0DB84,8FC848,FA4,00E*47
```

```
$GPALM,32,27,27,951,00,6876,90,FF35,FD3C,A10C74,80B9EA,0A4AD6,184805,018,000*3D
$GPALM,32,28,28,,,,,,,,,,,*7A
$GPALM,32,29,29,951,00,319F,90,083A,FD52,A10B16,AF7117,DFCD05,73FDE8,18B,00A*3F
$GPALM,32,30,30,951,00,2B68,90,0465,FD40,A10C6B,40D028,35B7A6,CA1E92,FDE,000*32
$GPALM,32,31,31,951,00,427D,90,0AC0,FD4B,A10C29,1DF576,6032CB,625E7B,003,000*46
$GPALM,32,32,32,,,,,,,,,,,*7A
```

5. Re: [TACGPS:1212] Re: TOC comments

From: "Robert H. Hamstra, Jr." <rhamstra@cirsol.com>
Date: Thu, 02 Apr 1998 01:26:39 -0800
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19980402012639.00947c70@shell12.ba.best.com>
Rendered body type: text/plain

First, let me thank Tom Clark for his work. It served me well as an introduction to the use of GPS for time and frequency.

I have a Stanford Research SC cut ovenized oscillator which I would like to discipline. It has drifted about 7.2e-9 parts over the last 14 months, which is not bad, but it can wander up to 0.4e-9 parts from the drift line (Oncore VP, 10,000 second average, linear least squares fit).

Having said the above, I suspect the most popular model will be the low cost one at 1e-9.

Tom Clark said:

>To get analog time constants in the 100-1000 second
>range requires some cleverness and careful component selection, but
>I think I see a way to do it. It requires a design layout that makes
>some elements have leakage resistances in the GigaOhm range. But
>the ionization smoke detector you buy at K-Mart for $10 has similar
>"electrometer" specifications, so it CAN be done!

Yes it can be done without difficulty. Use polypropylene caps and a CMOS input amp. Getting resistors from distributor stock above 750 Mohm may be a problem. Victoreen and others can supply much larger (up to 1e12 ohms or more) values. Metallized polypropylene caps up to at least 4.7uF are available from distributor stock. Board layout is important in this range. As an extreme example, I setup 5 battery powered op amp integrators on 17 Nov 1990 and have monitored their discharge since then. Fitting an exponential to the data (a poor fit) gives time constants of 16, 80, 160, 300 and 300 years. The largest errors during the first month was due to dielectric absorption and temperature, not leakage current. This test was started to verify that I could build precision filters at 1e-3 and 1e-4 Hz.
>
>Just today I built a fairly elaborate computer model for the analog
>TOC (in an Excel spreadsheet). The design is still too much in the
>formulative stages to post the details, but I'll give a couple of
>hints. The widget that measures the time difference between the GPS
>1PPS and the divided clock is one of the phase/freq detectors in a
>4046 IC. The high isolation amplitude integrator uses switched-
>capacitor techniques with 4066 CMOS switches. And some of the new
>op amps that have appeared in the past couple of years have really
>state-of-the-art performance with picoampere to femtoampere bias
>currents available for a few $$.
>

Be careful of the 4046. Its output can glitch. I had to abandon the 74HC4046 on a frequency discriminator design at 5 MHz. In this design the VCO voltage was high pass filtered and then sent to a voltage comparator. The comparator was set to trip on a deviation of 100 ppm. The design experienced frequent false trips due to the phase comparator. I have talked to one other designer who has had similar problems with the 74HC4046. I ended up with an ECL phase comparator.

With regard to 16 bit DACs, serial interface 16 bit DACs have become very reasonable over the last year or two.

If I can be of help in the TOC design effort, just let me know!

Best regards,

Bob Hamstra

 Robert H. Hamstra, Jr. - Circuit Solutions, San Jose, CA 95129

RHamstra@CirSol.com Voice: (408) 996-2166 Fax: (408) 446-9471

6. Re: [TACGPS:1237] Almanac data for GPS-20

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Thu, 02 Apr 1998 14:59:54 -0500
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980402145954.007aac60@appstate.campus.mci.net>
Rendered body type: text/plain

At 03:49 AM 4/2/98 -0600, you wrote:
>A week or two ago, Alan Sanders posted about almanac problems with his
>GPS-20. ...

Any chance the GPS-30s are "cranky" with the alamanc too? It is my
understanding that the '30 is a '20 with a built-in antenna.

73's
Don, W4DH

7. Re: [TACGPS:1239] Re: Almanac data for GPS-20

From: Dave Martindale <davem@cs.ubc.ca>
Date: Thu, 2 Apr 1998 12:25:58 -0800
To: tacgps@tapr.org
Message-ID: <l03130300b149a21e0cf4@[198.162.38.159]>
Rendered body type: text/plain

>Any chance the GPS-30s are "cranky" with the alamanc too? It is my
>understanding that the '30 is a '20 with a built-in antenna.

The 30 is apparently almost identical to the 20. The only differences
I've read about are the on-board voltage regulator on the 30, and the
absence of 5V power on the antenna jack.

However, my 20 was bought used and is quite old by now. Its software
is version 1.30, and the label on the ROM says copyright 1995. The
GPS 30s from TAPR are probably more recent firmware, and might also
be the 20SL board (a later version). So I don't know if they suffer
from the same problems.

The fact that it takes forever to collect an almanac might just be
because the 20 is single-channel, and loses satellites briefly with
great regularity. A more recent 20 isn't likely to fix that. But
it's almost certainly a bug that causes satellites to remain marked
unhealthy forever once they've been unhealthy once. That might
well be fixed.

An experiment to try: run your 30 for a couple of days, then have it dump
its almanac (send it $GPALM,1<CR><LF>). Then look at the 5th field of each
record (4th after the GPALM) - that's the GPS week. They should all be the
same, and 951 (or higher). If not, the lower numbers are stale entries.

Then check which SVs have empty entries - those are the poor health
satellites. Right now, it should be 11, 12, 20, 28, and 32 only. If there
are others, particularly 3, 13, and 19, then it still has the "forever
unhealthy" bug.

If you feel adventurous, try sending it the almanac I got from my 25,
and see if it starts using those formerly-ignored SVs.

        Dave

8. Re: [TACGPS:1238] Re: TOC comments

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Thu, 02 Apr 1998 13:41:12 +0100
To: tacgps@tapr.org
Message-ID: <35238768.7177DA28@clark.net>
Rendered body type: text/plain

Bob Hamstra wrote:
> [snip]

> >To get analog time constants in the 100-1000 second
> >range requires some cleverness and careful component selection, but
> >I think I see a way to do it. It requires a design layout that makes
> >some elements have leakage resistances in the GigaOhm range. But
> >the ionization smoke detector you buy at K-Mart for $10 has similar
> >"electrometer" specifications, so it CAN be done!
>

> Yes it can be done without difficulty. Use polypropylene caps and a CMOS
> input amp. Getting resistors from distributor stock above 750 Mohm may be a
> problem. Victoreen and others can supply much larger (up to 1e12 ohms or
> more) values. Metallized polypropylene caps up to at least 4.7uF are
> available from distributor stock. Board layout is important in this range.
> As an extreme example, I setup 5 battery powered op amp integrators on 17
> Nov 1990 and have monitored their discharge since then. Fitting an
> exponential to the data (a poor fit) gives time constants of 16, 80, 160,
> 300 and 300 years. The largest errors during the first month was due to
> dielectric absorption and temperature, not leakage current. This test was
> started to verify that I could build precision filters at 1e-3 and 1e-4 > Hz.

Very interesting report. It's good to see that some others remember the old
analog techniques!

One of my design goals was to try to make things work using only parts from
DigiKey/Farnell/Radio Shack etc. The Victoreen resistors fail this test.
So the idea I've been designing around (and am nearly ready to prototype)
involves the use of smaller resistors (1-10 Meg) and capacitors (.1-1 uF)
and then to use switched capacitor techniques using CMOS (i.e. 4066 class)
aalog switches. Since we have plenty of good clock signals around in the
10 MHz -> 1PPS divider, we can easily get any duty cycle we need. If the
series R is gated on for only a fraction of time = F, then the equivalent
time constant is RC/F with a multiplication of 100 being easy. The switches
can be arranged in "bucket brigade" fashion, "dirty" circuits can be
isolated from the clean signals needed at the output. The off resistance
of a 4066 is in the 10e12 to 10e13 range.

> [snip]
> >hints. The widget that measures the time difference between the GPS
> >1PPS and the divided clock is one of the phase/freq detectors in a
> >4046 IC. The high isolation amplitude integrator uses switched-
> >capacitor techniques with 4066 CMOS switches. And some of the new
> >op amps that have appeared in the past couple of years have really
> >state-of-the-art performance with picoampere to femtoampere bias
> >currents available for a few $$.
> >
>
> Be careful of the 4046. Its output can glitch. I had to abandon the
> 74HC4046 on a frequency discriminator design at 5 MHz. In this design the
> VCO voltage was high pass filtered and then sent to a voltage comparator.
> The comparator was set to trip on a deviation of 100 ppm. The design
> experienced frequent false trips due to the phase comparator. I have talked
> to one other designer who has had similar problems with the 74HC4046. I
> ended up with an ECL phase comparator.

Thanks for the hint. In this case, I had actually planned on using the
"improved" 74VHC4046 which I think is more suitable for precision
applications. And the driver circuitry generates GPS & xtal 1PPS signals
that are narrow (< 1 usec wide) to minimize the potential "pulses arrived
at exactly the same time" race condition. Do you see any problems?

Tom

9. dGPS Reciever

From: Darryl Smith <vk2tds@ozemail.com.au>
Date: Fri, 03 Apr 1998 17:52:08 +1000
To: tacgps@tapr.org
Message-ID: <35249527.A361B820@ozemail.com.au>
Rendered body type: text/plain

G'Day...

There is a new dGPS transmitter being commisioned about 10 KM from me (At Holsworthy, NSW,
Australia) on 304 KHz MSK.

Are there any very cheap kits available to pick up the dGPS signal? Or should I build my own.
I think that if I
    Amplified the incoming signal and filtered it
    Mixed it with 304 KHz
    Mixed out everything above 500 Hz
    Intergrated over each bit period

I would then get the raw data out as transmitted - or am I missing something with the MSK
modulation and demodulation?

Also, how would I get a signal that I could then re-transmit and have something make sense of
it? Is this data stream synchronous, or async?

I have done some of this at uni in electrical Engineering, but it has been about 3 years
since I needed to deal with the internals of demodulating a modulated signal

Many thanks
Darryl Smith

Sydney Australia
[Attachment: smime.p7s; application/x-pkcs7-signature; 4,258 bytes]

10. Re: [TACGPS:1239] Re: Almanac data for GPS-20

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Fri, 03 Apr 1998 07:07:15 +0100
To: tacgps@tapr.org
Message-ID: <35247C93.5918CB10@clark.net>
Rendered body type: text/plain

Don Haselwood asked:

> Any chance the GPS-30s are "cranky" with the alamanc too? It is my
> understanding that the '30 is a '20 with a built-in antenna.
>
> 73's
> Don, W4DH

Yep, the receiver in the -20 & -30 are the same. This is also
essentially the same rcvr they use in the GPS-38, -40, -45, -45XL
and GPS-II handhelds also, and all are 8-satellite sequential rcvrs
(which I understand have only two DSP rcvr channels in them), and they have all
proven to be "twichy".

The 12-channel technology like the GPS-25 is similar to the Garmin
GPS-12, -12XL, GPS-II+, GPS-III and the new "StreetPilot". My
observation is that the GPS-II+, GPS-III and GPS-25's that I've
tried are vast improvements over the earlier 8-channel sequential
rcvrs.

73, Tom

11. Re: Differential GPS project

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Fri, 03 Apr 1998 06:59:47 +0100
To: Pete Prossen <prossen@znet.com>
Cc: Garmin GPS users <garmin@avalon.microtech.com>, TACGPS <tacgps@tapr.org>
Message-ID: <35247AD2.CBACC313@clark.net>
Rendered body type: text/plain

Pete Prossen wrote:
>
> Dear Garmin aficionados and aficionadas
>
> I am beginning research on a project for the Palomar Amateur Radio Club
> here in San Diego county, CA. We wish to add another transmitter to our
> repeater site on Palomar mountain, dedicated to transmitting reasonably
> accurate digital DGPS correction data for use by our members and any other
> persons who may wish to use it for non-business applications.
>
> Any guidance, suggestions, or help in any form would be most appreciated.
>
> My personal GPS unit is a GPS III, and I love it. My wife and I use it on
> motorcycle rides in scenic areas around the country so we won't forget how
> to get back to our RV.
>
> Regards
>
> Pete Prossen
>
> WA6ZUH

Pete -- I believe I was the first to generate/transmit DGPS corrections to the
amateur community. My W3IWI-13 has be on the air for a couple of years here in
the Balto/Wash area. My initial adventures tapped the RTCM SC-104 corrections
generated by a ~$25,000 Trimble 4000SSE GPS rcvr when it wasn't needed for
other purposes.

In the past couple of months a MUCH CHEAPER option has become available. TAPR
(Tucson Amateur Packet Radio) now has an RTCM SC-104 DGPS generator based on
the Motorola ONCORE OEM GPS rcvr. For several years, the ONCORE (and its
PVT-6 predecessor) could generate DGPS signals in a proprietary (but well
documented) format. What N7HPR/TAPR have developed is a small circuit board

that mounts the ONCORE and which has a PIC microprocessor programmed to
convert the Motorola format into RTCM Type 1 SC-104 DGPS messages. In
controlled tests, we have seen the N7HPR board make a small "slave" into
a 1-2 meter class instrument. The TAPR widget has >50-fold price advantage
over the professional Trimble rcvr I have been using! The cost of a ONCORE
plus the N7HPR interface board plus a GPS antenna is under $500.

If this is of any interest, surf over to the TAPR web page at
    http://www.tapr.org
and then click on the [NEW! DGPS Reference Station] button.

To support the DGPS board and my "Totally Accurate Clock" (you can glean
info on the TAC project by clicking on the [W3IWI/TAC-2] button), TAPR runs
the TACGPS mail exploder. You can subscribe to the list by clicking on the
[SIGS] button on the TAPR home page.

Hope this helped answer your questions -- 73 de Tom, W3IWI

12. Re: Horology -- A Washington DC area special

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Fri, 03 Apr 1998 03:38:30 +0100
To: TACGPS <tacgps@tapr.org>
Message-ID: <35244BA6.316451B4@clark.net>
Rendered body type: text/plain

For Mike Petry and anyone else who wants to attend the LONGITUDE
seminar at Goddard next Monday, Apr.6 --

The seminar is at 15:30 in the Bldg.3 Auditorium. Coffee/Tea is
available startinbg ~15:15.

To get there:
Use the Main Gate at NASA Goddard on MD 193 (a.k.a. Greenbelt Road).
>From Washington, take the Balto/Wash Pkwy north and get off at the
MD193 exit. From the Washington Beltway, you will get onto the
B/W Pkwy for a few hundred feet, then exit onto MD193.
 [The Goddard exit from the Balto/Wash Parkway is for employees only.
  Unless you have a NASA badge, don't try to use this entrance --
  you'll just be wasting your time!]
MD193 eastbound has a NASA Goddard Sign. You go about 2 miles to the
Goddard main entrance on your left.

Or, if you happen to be coming south on the B/W Pkwy, the easiest
exit to take is Powder Mill Road, north of Goddard. At the end of
the exit ramp (@ Lat=39d02.0N, 76d51.1W), hang a left. In about 0.3
miles, turn right (south) on Soil Conservation Road (affectionately
known to the locals as Pig Farm Road, @ 30d02.0N, 76d50.8W). Proceed
south ~2 miles. You will pass by WA3NAN (@38d59.9N, 76d50.8W) and
then pass thru 2 traffic lights associated with Goddard. At the next
intersection, about 0.2 mi south of the 2nd light, turn right on
MD193. The Goddard Main Gate will be the first right.

Turn north to enter the gatehouse and park temporarily in the lot.
You then have to sign in at the main gate to get a visitors pass --
Just say that you are attending the Engineering Colloquim in Bldg.3.
The guards will give you a Goddard map if you need it. [If you are
not a US Citizen let me know immediately 'cuz I have to make a phone
call for you].

As you leave the Gatehouse (heading north), Bldg.3 is the first
building on your right, and the auditorium is accessed thru the door that is
nearest to the gatehouse (southwest corner of Bldg.3).
Find your own parking place wherever you can.

73, Tom

13. Request for Help Setting Up Oncore

From: Kenneth Lerman <Kenneth.Lerman@lerman.nai.net>
Date: Fri, 3 Apr 1998 07:44:33 -0500 (EST)
To: tacgps@tapr.org
Cc: lerman@lerman.nai.net (Kenneth Lerman)
Message-ID: <199804031244.AA02091@lerman.nai.net>
Rendered body type: text/plain

I've recently purchased a Motorola Oncore which I would like to use
with a program called Maptitude. Maptitude requires NMEA input.

I have the Oncore working with the test program that is shipped with
it.

What commands must I issue to the Oncore to place it in a mode where
it will continuously send NMEA data? What is the default data rate?

Any help would be appreciated.

Thanks,

Ken

--
Kenneth Lerman   Kenneth.Lerman@lerman.nai.net
Systems Essentials Limited   Fax: (203)426-9138
55 Main Street   Voice: (203)426-4430
Newtown, CT 06470   http://lerman.nai.net/~lerman
PGP fingerprint = B1 66 29 FB CB 8C 6A 24 E1 DF B4 63 2C D6 5D AD

14. Re: [TACGPS:1246] Request for Help Setting Up Oncore

From: "Steven R. Bible" <srbible@gate.net>
Date: Fri, 03 Apr 1998 18:58:03 -0500
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19980403185803.008b2680@pop.gate.net>
Rendered body type: text/plain

At 07:46 AM 4/3/98 -0600, you wrote:
>
>I've recently purchased a Motorola Oncore which I would like to use
>with a program called Maptitude. Maptitude requires NMEA input.
>
>I have the Oncore working with the test program that is shipped with
>it.
>
>What commands must I issue to the Oncore to place it in a mode where
>it will continuously send NMEA data? What is the default data rate?
>
>Any help would be appreciated.

Ken, go to the TAPR Oncore web page at

   http://www.tapr.org/gps/oncore.html

Down toward the bottom there is a link to a RTF document entitiled

   Operating the Motorola GPS Engines In NMEA-0183 Mode

This might get you started.

 - Steve, N7HPR
 (n7hpr@tapr.org)

15. Rubidium Standards Available

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Sun, 05 Apr 1998 03:52:05 +0100
To: TACGPS <tacgps@tapr.org>
Message-ID: <3526F1D5.43B5B728@clark.net>
Rendered body type: text/plain

For those who might be interested in getting a really good lab-
quality frequency standard, Lehmann Scientific again has Ball/
Efratom FRK 10 MHz modules available for $500.

The last ones of these that I saw were over-runs from a military
project (I believe they were used by Raytheon in the crypto module
for Patriot missiles). They came in their sealed MIL storage packages
and were vintage ~1988. Lehmann used to charge $800, so his new
price shows that there is some quantity available.

The salient specs are that the units put out 10 MHz and have ~1:10e10
stability (i.e. < 10 usec/day clock drift). They run on 22-32VDC and
need ~2 Amps of power. The size of the module is ~4" x 4" x 6".

Some details can be seen in Lehmann's ad in the April Nuts & Volts
(upper left-hand corner, Pg 31), or on Lehmann's web site at URL

    http://www.lehmanscientific.com/Miscelec.html
 or http://www.lehmanscientific.com/feature.html

If these are like the earlier FRKs, they do not have the frequency setting control brought out to the power connector -- the frequency is tweaked manually with a pot. However, I have figured out a simple mod that brings out the control signal for external steering. FYI -- you tweak the frequency of the Rb reference cell by adjusting the "C-field" magnetic field. This requires a ~0-20 ma current. [There is also a tweaker for the internal xtal frequency -- it is used to bring the xtal into the middle of the internal PLL tuning range].

If anyone is interested in these RBs and needs a suitable ~24v power supply, I've also located a surplus source for a nice, small switching supply used in Sun workstations. For $10 each, you get +12V @ 4A and +5v @ 4.5A; two supplies are stacked in series giving you any/all of the voltages +5v, +12v, +17v & +24v. The Sun supplies are made by Sony and each is in a case ~ 2.5" x 2.5" x 10" with a standard IEC connector for the 100-260VAC input -- thus the total volume for 2 supplies is ~5" x 2.5" x 10". The Efratom Rb standard mounts neatly atop a pair of these supplies. The source is Marlin P Jones -- see the upper left-hand corner of the back cover of their latest (98-2A) for #9042-PS. Theeir web site is http://www.mpja.com and if you fill out their online order, you'll get a catalog withing a week. MPJA is one of the best sources for miscellaneous power supplies.

73, Tom

16. Trimble SV-6

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Sun, 05 Apr 1998 04:45:47 +0100
To: TACGPS <tacgps@tapr.org>
Message-ID: <35270C7B.96C62F61@clark.net>
Rendered body type: text/plain

On page 3 of the April Nuts & Volts, I spotted a "GPS Hacker Special" from Halted Specialties in California. On surfing the web, the real details are found at URL

http://www.halted.com/gizmo/gz030998.htm

This appears to be the old (circa 1993) Trimble SV-6 receiver which is the one that was how I began my GPS timing experiments (it seems like eons ago!). Halted shows that the rcvr plus antenna is $69. Considering the last time I bought these antennas, they were $94, it looks like a fairly good deal!

The rcvr appears to be the version with only one RS232 port, and it appears that it has the somewhat bizzare TAIP (Trimble ASCII Interface Protocol) ROMs installed and the output is not in NMEA format -- Not too useful, but not hopeless either. Neither SHOWTIME nor TAC32 support Trimble's TAIP or TSIP protocols.

The SV-6 is a 6-channel rcvr, but it selects the best 4 satellites being tracked and does the deterministic PVT solution (not the over-determined, least-squares or Kalman filter fitting that the ONCORE & GPS-25 do, using ALL satellites that are in lock) -- hence its accuracy is not the greatest in the world.

Assuming that this rcvr has its 1PPS option enabled, the 1PPS is good to the ~1 usec level. The 1PPS pulse is 1 usec wide, open-collector, negative going. The CMOS 555 in the TAC-2 was included (in part) to make the SV-6 rcvr produce a "TAC standard" +going pulse 0.1 to 0.2 seconds wide.

Halted also has the rcvr available mounted in a sealed box with an 80C186 processor which logs data to a built-in 3.5" floppy for $129.

If anyone happens to buy one of these units, please report back on how useful it actually is! If anyone on TACGPS happens to be in Santa Clara or Sacramento, you might take a look and make a report on what they look like.

73, Tom

17. RIPE Test Box

From: "Steven R. Bible" <srbible@gate.net>
Date: Sun, 05 Apr 1998 11:34:15 -0400
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19980405113415.00859bd0@pop.gate.net>
Rendered body type: text/plain

It's been awhile since I visited Henk's web page at RIPE. Take a look at
what his group did to mount the TAC-2 on a full size ISA card. It's on

    http://www.ripe.net/test-traffic/Misc/

and look to the very bottom of the page.

Great idea!

 - Steve, N7HPR
 (n7hpr@tapr.org)

18. Re: Fluctuation in signal strength Garmin 25

From: Allen Schaeffer <ascha@erols.com>
Date: Sun, 05 Apr 1998 12:44:03 -0400
To: tacgps@tapr.org
Message-ID: <3527B4D3.AE73AC5C@erols.com>
Rendered body type: text/plain

I have been using TAC-2 with Garmin 25 and have noticed today marked
fluctations in sat signal strength resulting in loss of fix for several
minutes at a time. I do not seem to see the same with a 12xl. Is this a
characteristic of the 25 or perhaps it is dying?

19. Re: [TACGPS:1248] Rubidium Standards Available

From: Kohjin Yamada <kohjin@cosmos.marina.prug.or.jp>
Date: Mon, 06 Apr 1998 01:05:08 +0900
To: tacgps@tapr.org
Message-ID: <199804051605.BAA01557@cosmos.marina.prug.or.jp>
Rendered body type: text/plain

Tom and All,

Thank you very much for the real great info's.
I have visited the web page and saw the spec and picture too.
Couldn't stop to send my 2 cents post here now because the similar
unit M-100 series from Ball/Efratom are in sale here in Japan.
I was told that these are circulated in USA and the price here is
ridiculous ~300000Yen! (about $2300?)

It's picture is just about the same as FRK-L.
Here are their spec, you can see almost same as FRK-L;

M-100 series -- 10Mhz sine 0.5vrms into 50Ω□(M-100-LN 5MHz 1.5vrms)
M-100   standard
M-100-LN   5MHz Low phase Noise ¯155dB @ 300Hz
M-100-H   High spec Low drift 1x10e11/mo 3x10e11/sec 3x10e12/100sec
M-100-HC   High-temp environment 75□
M-100-FW   Fast Warm-up 5 minutes to reach 2x10e10 at 25□

Wonder if there're such different options (type) in FRK series too?
Also, wonder anyone knows the source for M-100 series.
Puzzling - Why Efratom OSC spec is degraded than HP 5065A Rb standard ?
(except M-100-H long term stability)
i.e; HP 5065A 1x10e11/mo 5x10e12/sec 5x10e13/100sec

I can accept for ¯$500_for_TOC + $520_Rb_OSC_withPS.
Need an ultimate TOC not a toy!

73 Kohjin, JR1EDE

At 22:02 98/04/04 -0600, you wrote:
> For those who might be interested in getting a really good lab-
> quality frequency standard, Lehmann Scientific again has Ball/
> Efratom FRK 10 MHz modules available for $500.
>
> The last ones of these that I saw were over-runs from a military
> project (I believe they were used by Raytheon in the crypto module
> for Patriot missiles). They came in their sealed MIL storage packages
> and were vintage ¯1988. Lehmann used to charge $800, so his new
> price shows that there is some quantity available.
>
> The salient specs are that the units put out 10 MHz and have ¯1:10e10
> stability (i.e. < 10 usec/day clock drift). They run on 22-32VDC and
> need ¯2 Amps of power. The size of the module is ¯4" x 4" x 6".
>
> Some details can be seen in Lehmann's ad in the April Nuts & Volts

> (upper left-hand corner, Pg 31), or on Lehmann's web site at URL
>
>   http://www.lehmanscientific.com/Miscelec.html
> or http://www.lehmanscientific.com/feature.html
>
> If these are like the earlier FRKs, they do not have the frequency
> setting control brought out to the power connector -- the frequency
> is tweaked manually with a pot. However, I have figured out a simple
> mod that brings out the control signal for external steering. FYI --
> you tweak the frequency of the Rb reference cell by adjusting the
> "C-field" magnetic field. This requires a ¯0-20 ma current. [There
> is also a tweaker for the internal xtal frequency -- it is used to
> bring the xtal into the middle of the internal PLL tuning range].
>
> If anyone is interested in these RBs and needs a suitable ¯24v power
> supply, I've also located a surplus source for a nice, small switching
> supply used in Sun workstations. For $10 each, you get +12V @ 4A
> and +5v @ 4.5A; two supplies are stacked in series giving you any/all
> of the voltages +5v, +12v, +17v & +24v. The Sun supplies are made by
> Sony and each is in a case ¯ 2.5" x 2.5" x 10" with a standard IEC
> connector for the 100-260VAC input -- thus the total volume for 2
> supplies is ¯5" x 2.5" x 10". The Efratom Rb standard mounts neatly
> atop a pair of these supplies. The source is Marlin P Jones -- see
> the upper left-hand corner of the back cover of their latest (98-2A)
> for #9042-PS. Theeir web site is http://www.mpja.com and if you fill
> out their online order, you'll get a catalog withing a week. MPJA is
> one of the best sources for miscellaneous power supplies.
>
> 73, Tom
>
>
>

20. Re: [TACGPS:1248] Rubidium Standards Available

From: Brian Chesire <BCChesire@worldnet.att.net>
Date: Sun, 05 Apr 1998 12:16:47 -0700
To: tacgps@tapr.org
Message-ID: <3527D89F.3031@worldnet.att.net>
Rendered body type: text/plain

Hi Tom,

        I've been running one of the surplus EFRATOM ML100's since Sept. 15
1993. Long term drift settled to something I can,t measure with my WWVB
comparators, I used a Magellan timing board in a time interval set up
for the last several years. My long term delta is 2.75X10e-12 to
5.50X10e-12. Total drift since start up has been -9x10e11. Disclaimer:
due to power fluctuations thunderstorms and homade time interval counter
failures all figures above are questionable, but they are for the most
part consistent.
        The only adjustment I've made is a one time reset of the C field to
recenter the VCO control voltage.
        I'd be interested in your mod. After almost 5 years I don't think I'll
have a heart attack at the thought of removing the ML-100 cover.

73's Brian
WA5PPO Tucson, AZ

21. Re: [TACGPS:1253] Re: Rubidium Standards Available

From: Gary Sanders <gsanders@gte.net>
Date: Sun, 05 Apr 1998 18:22:29 -0400
To: tacgps@tapr.org
Message-ID: <35280425.7852F94E@gte.net>
Rendered body type: text/plain

If you don't mind, I (and I'm sure others) would be interested in
a description and other information on your Magellan driven time
interval device.

Is it something that could be easily reproduced by others?

Gary Sanders
WB0BZR

Brian Chesire wrote:
>
I used a Magellan timing board in a time interval set up
> for the last several years. My long term delta is 2.75X10e-12 to
> 5.50X10e-12. Total drift since start up has been -9x10e11. Disclaimer:

> due to power fluctuations thunderstorms and homade time interval counter
> failures all figures above are questionable, but they are for the most
> part consistent.

>
> 73's Brian
> WA5PPO Tucson, AZ

22. Re: [TACGPS:1254] Re: Rubidium Standards Available

From: Brian Chesire <BCChesire@worldnet.att.net>
Date: Sun, 05 Apr 1998 17:33:17 -0700
To: tacgps@tapr.org
Message-ID: <352822CD.5CFF@worldnet.att.net>
Rendered body type: text/plain

Gary Sanders wrote:
>
> If you don't mind, I (and I'm sure others) would be interested in
> a description and other information on your Magellan driven time
> interval device.
>
> Is it something that could be easily reproduced by others?
>
> Gary Sanders
> WB0BZR

Gary
        The systems kind of a kluge but it does work. Beg borrow or steal a copy of HP's app note 52-2, "Timekeeping and Frequency Calibration", it explains the time interval method better than I can. In short you use your oscillator as the time base for a time interval counter, and at the same time divide it down to 1 pps. This local 1 pps is used to start the counter. The GPS 1 pps is used as a stop pulse. When you first start up you get a number based on the time difference between your start pulse and the GPS pulse. As time accumulates, any difference between the pulses will show up as a inrease or decrease in the time interval. My method is manual. I start a sequence and note the start clock time and start count and then x hours later note the count and how many seconds have elapsed. From there its straight forward algebra to a difference. Obviously good only for long term measurements.
        The Magellan timing board I use had terrible jitter on the 1 pps output but it has a 1 Khz output also. I divided this down to 1 pps to use with the time interval counter. It, like the older Garmin's tends to lose lock. So If I start getting outrageous numbers, I ignore them and do another run.
        The time interval counter is an old Intersil ICM7226A universal counter chip evaluation board, with a couple buffers added to the inputs and external clock selected. The chip is a marvel of 10 pounds in a 2 pound bag but it is it bit hard to understand how some functions are enabled. The ICM7226A is still available, made by Harris and Alltronics had some at about half the price of the commercial outlets. I had a half designed 8051 controller for it but other things and my lousy software writing put it on the back burner. Hope this helps.

 73's Brian
 WA5PPO Tucson, AZ

23. Re: [TACGPS:1248] Rubidium Standards Available

From: peter van daalen <peter@vandaalen.demon.nl>
Date: Mon, 06 Apr 1998 02:48:15 +0200
To: tacgps@tapr.org
Message-ID: <3528264F.EFD38C07@vandaalen.demon.nl>
Rendered body type: text/plain

Tom Clark (W3IWI) wrote:

> For those who might be interested in getting a really good lab-
> quality frequency standard, Lehmann Scientific again has Ball/
> Efratom FRK 10 MHz modules available for $500.

> snip

> If these are like the earlier FRKs, they do not have the frequency
> setting control brought out to the power connector -- the frequency
> is tweaked manually with a pot. However, I have figured out a simple
> mod that brings out the control signal for external steering.

snip

> 73, Tom

Two questions if Tom would be kind enough.

1. Does this mean that - at least in principle - this rubidium standard could be
controlled by gps ? If so, could TAC be employed for this (again, in principle) ?

Toms' ftp:// aleph/...../allen variances graph shows that after the five hours term a gps-control could improve the oscillators stability over 10e12.
And after 12 days gps-control beats a super cesium standard ; this is the x-
axis limit of the graph , so :

2. how does gps-controlled stability develop a f t e r two weeks?
(Onsala H-maser was measured with TAC ?)

Thanks for attention on both subjects.

By the way, I buy this rubidium standard anyway (unless someone knows a bit better phase-noise performer than -120 dBc/hz at 200 hz ?). It may be perfect
for very narrow band 24 Ghz stuff. Small sized and 1 kg portable as well.
Thanks for the tip.

Peter, Amsterdam, Holland
PE1ECM

24. Re: [TACGPS:1255] Re: Rubidium Standards Available

From: Gary Sanders <gsanders@gte.net>
Date: Sun, 05 Apr 1998 21:38:25 -0400
To: tacgps@tapr.org
Message-ID: <35283211.D6A6FF61@gte.net>
Rendered body type: text/plain

Brian,

Thank you for the quick turnaround.

I'll dig out my old counter/timer and see what happens. With a few "improvements" it should work.

I'll also track down HP ap note 52.2

Gary Sanders

Brian Chesire wrote:
>

> In short you use
> your oscillator as the time base for a time interval counter, and at the
> same time divide it down to 1 pps. This local 1 pps is used to start the
> counter. The GPS 1 pps is used as a stop pulse.
--

Gary Sanders

Bait for spammers (With credit to E. Needham):
root@localhost
postmaster@localhost
admin@localhost
abuse@localhost
postmaster@127.0.0.1

25. Re: Rubidium Standards Available

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Mon, 6 Apr 1998 10:00:47 -0400
To: "TAC-2 mail list" <tacgps@tapr.org>
Message-ID: <000001bd6164$662a1620$481f5c18@john.tampabay.rr.com>
Rendered body type: text/plain

If anyone has success finding HP Ap Note 52.2 "Timekeeping and Frequency Calibration" please let me know as I would like to order a copy. Maybe TAPR could obtain some copies from HP and make them available to members for a

small fee. Apparently it is quite a popular document among those of us
interested in knowing what time it is (within a few microseconds).

73, John W4SF

26. Re: [TACGPS:1258] Re: Rubidium Standards Available

From: "JOHN DEGOOD" <jdegood@sarnoff.com>
Date: Mon, 06 Apr 1998 11:02:49 -0400
To: tacgps@tapr.org
Message-ID: <3528EE99.74DB75E3@sarnoff.com>
Rendered body type: text/plain

HP's web page for AN 52-2 is:

   http://www.tmo.hp.com/tmo/Notes/English/5952-7874.html

There appears to be no softcopy version of AN 52-2, but they do have
several other timekeeping app notes available in PDF format. See:

   http://www.tmo.hp.com/tmo/Notes/English/

for an index.

John

John K. Pringle wrote:
>
> If anyone has success finding HP Ap Note 52.2 "Timekeeping and Frequency
> Calibration" please let me know as I would like to order a copy. Maybe TAPR
> could obtain some copies from HP and make them available to members for a
> small fee. Apparently it is quite a popular document among those of us
> interested in knowing what time it is (within a few microseconds).
>
> 73, John W4SF

27. HP 52-2

From: "Gordon T. Uber" <gordon@ubr.com>
Date: Mon, 6 Apr 1998 10:28:20 -0700
To: <tacgps@tapr.org>
Message-ID: <199804061728.KAA16857@proxy3.ba.best.com>
Rendered body type: text/plain

In July 1995 the contact information for getting a printed copy of App Note
was

Marsha P. Mirman
Inquiry Fulfillment Manager

Hewlett-Packard Company
Direct Marketing Organization
5301 Stevens Creek Blvd.
PO Box 58059 MS 51LSJ
Santa Clara, CA 95052-8059
408-246-4300

Note: 52-2 is a revision of App Note 52 of 1965.

Gordon
--
| XII | Gordon T. Uber, 3790 El Camino Real, Suite 142
| XI | Palo Alto, CA 94306-3314, email: gordon@ubr.com
| X \   /| CLOCKS and TIME: http://www.ubr.com/clocks/
| IX   \   / | Reynen & Uber WebDesign: http://www.ubr.com/rey&ubr

----
> From: John K. Pringle <jpringle@tampabay.rr.com>
> To: tacgps@tapr.org
> Subject: [TACGPS:1258] Re: Rubidium Standards Available
> Date: Monday, April 06, 1998 7:04 AM
>
> If anyone has success finding HP Ap Note 52.2 "Timekeeping and Frequency
> Calibration" please let me know as I would like to order a copy. Maybe
TAPR
> could obtain some copies from HP and make them available to members for a
> small fee. Apparently it is quite a popular document among those of us
> interested in knowing what time it is (within a few microseconds).
>
> 73, John W4SF
>

28. Re: [TACGPS:1259] Re: Rubidium Standards, etc.

From: "James L. Johnson" <jjjohnson@saiph.hpl.hp.com>
Date: Mon, 6 Apr 1998 10:47:42 -0800 (PDT)
To: tacgps@tapr.org
Message-ID: <199804061747.KAA22867@saiph.hpl.hp.com>
Rendered body type: text/plain

>
> HP's web page for AN 52-2 is:
>
>   http://www.tmo.hp.com/tmo/Notes/English/5952-7874.html
>
> There appears to be no softcopy version of AN 52-2, but they do have
> several other timekeeping app notes available in PDF format. See:
>
>   http://www.tmo.hp.com/tmo/Notes/English/
>
> for an index.
>
> John
>
> John K. Pringle wrote:
> >
> > If anyone has success finding HP Ap Note 52.2 "Timekeeping and Frequency
> > Calibration" please let me know as I would like to order a copy. Maybe TAPR
> > could obtain some copies from HP and make them available to members for a
> > small fee. Apparently it is quite a popular document among those of us
> > interested in knowing what time it is (within a few microseconds).
> >
> > 73, John W4SF

Well, this is an unfortunate development, but apparently the division
that produces frequency counters no longer publishes these old
application notes, such as AN 52-2, etc. I looked at HP's app note
web page and what they have for 52-2 bears little to no resemblance
to the "real" 52-2. The reason cited for the demise of 52-2 is that
it suggests time transfer methods utilizing LORAN and WWV rather than
the present techniques using GPS. It was felt that it would be bad
press to suggest that customers use techniques which are far outdated.
Well, that may be true, but they threw out the baby with the bath
water ... the sections on how to make frequency, time interval, and
short-term stability measurements are also no longer available now.

I almost hate to make this offer, but if somebody needs specific
sections of 52-2, I will photocopy them and send them out. The whole
app note is about 65 pages long so sending the whole thing is not
very practical.

73,

Jim W6SC
Hewlett-Packard Laboratories
Precision Instrumentation
Palo Alto, CA

29. Re: [TACGPS:1261] Re: Rubidium Standards, etc.

From: John Ackermann N8UR <jra@febo.com>
Date: Mon, 06 Apr 1998 14:21:07 -0400
To: tacgps@tapr.org
Message-ID: <199804061821.OAA18762@meow.febo.com>
Rendered body type: text/plain

Hi Jim --

Is there any chance that HP would give permission for TAPR to reproduce
the document on a limited basis?

John N8UR
n8ur@tapr.org

In message <199804061747.KAA22867@saiph.hpl.hp.com>, "James L. Johnson" writes:
>>
>> HP's web page for AN 52-2 is:
>>
>>   http://www.tmo.hp.com/tmo/Notes/English/5952-7874.html
>>
>> There appears to be no softcopy version of AN 52-2, but they do have
>> several other timekeeping app notes available in PDF format. See:

>>
>>   http://www.tmo.hp.com/tmo/Notes/English/
>>
>> for an index.
>>
>> John
>>
>> John K. Pringle wrote:
>> >
>> > If anyone has success finding HP Ap Note 52.2 "Timekeeping and Frequency
>> > Calibration" please let me know as I would like to order a copy. Maybe TAP
>R
>> > could obtain some copies from HP and make them available to members for a
>> > small fee. Apparently it is quite a popular document among those of us
>> > interested in knowing what time it is (within a few microseconds).
>> >
>> > 73, John W4SF
>
>Well, this is an unfortunate development, but apparently the division
>that produces frequency counters no longer publishes these old
>application notes, such as AN 52-2, etc. I looked at HP's app note
>web page and what they have for 52-2 bears little to no resemblance
>to the "real" 52-2. The reason cited for the demise of 52-2 is that
>it suggests time transfer methods utilizing LORAN and WWV rather than
>the present techniques using GPS. It was felt that it would be bad
>press to suggest that customers use techniques which are far outdated.
>Well, that may be true, but they threw out the baby with the bath
>water ... the sections on how to make frequency, time interval, and
>short-term stability measurements are also no longer available now.
>
>I almost hate to make this offer, but if somebody needs specific
>sections of 52-2, I will photocopy them and send them out. The whole
>app note is about 65 pages long so sending the whole thing is not
>very practical.
>
>73,
>
>Jim W6SC
>Hewlett-Packard Laboratories
>Precision Instrumentation
>Palo Alto, CA

30. garmin gps 30/35pc logged wander

From: Garwood745 <Garwood745@aol.com>
Date: Mon, 6 Apr 1998 20:08:53 EDT
To: tacgps@tapr.org
Message-ID: <a2366b70.35296e98@aol.com>
Rendered body type: text/plain

I bought two of the garmin gps with ant board in one mouse size pac. I am
logging gps output. One question at 1100 hrs today my garmin logged a 2100
mile trip one
way into the atlantic ocean. I am in northern VA.

has anyone else had this level of wandering with the garmin bought from tapr
store?

thanks to all

garywoodward

31. Re: Rubidium Standards, etc.

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Mon, 6 Apr 1998 22:16:28 -0400
To: "TAC-2 mail list" <tacgps@tapr.org>
Message-ID: <000001bd61cb$2c4de640$481f5c18@john.tampabay.rr.com>
Rendered body type: text/plain

James L. Johnson wrote:
[snip]
> almost hate to make this offer, but if somebody needs specific
>sections of 52-2, I will photocopy them and send them out. The whole
>app note is about 65 pages long so sending the whole thing is not
>very practical.

Jim -- It is very thoughtful of you to make this offer, but without some
sort of index it wouldn't be too practical. I can understand why HP has
withdrawn the document as much of it is now obsolete (I understand Loran-C

will be phased out soon). Perhaps instead you might pass along the
suggestion to the HP Time/Frequency Dept. that they consider publishing an
updated edition of 52-2 with all the good basic material retained but
including the newer techniques such as GPS.

Thanks again for your offer.

73, John W4SF

32. Re: [TACGPS:1262] Re: Rubidium Standards, etc.

From: "Charles M. Coldwell" <coldwell@cfaiota0.harvard.edu>
Date: Tue, 7 Apr 1998 09:58:00 -0400
To: tacgps@tapr.org
Message-ID: <199804071358.JAA03389@cfaiota0.harvard.edu>
Rendered body type: text/plain

On the subject of important technical documents now sadly out of
print, does anybody know where I might get a hold of a copy of the
National Bureau of Standards Monograph #140, "Time and Frequency:
Theory and Fundamentals"?

Chip

--

Charles M. Coldwell
Harvard-Smithsonian Center for Astrophysics
60 Garden St. MS #20
Cambridge, MA 02138
(617) 495-7491

33. Re: [TACGPS:1265] Re: Rubidium Standards, etc.

From: "James L. Johnson" <jjjohnson@saiph.hpl.hp.com>
Date: Tue, 7 Apr 1998 07:59:57 -0800 (PDT)
To: tacgps@tapr.org
Message-ID: <199804071459.HAA10952@saiph.hpl.hp.com>
Rendered body type: text/plain

>
>
> On the subject of important technical documents now sadly out of
> print, does anybody know where I might get a hold of a copy of the
> National Bureau of Standards Monograph #140, "Time and Frequency:
> Theory and Fundamentals"?
>
> Chip
>
> --
>
> Charles M. Coldwell
> Harvard-Smithsonian Center for Astrophysics
> 60 Garden St. MS #20
> Cambridge, MA 02138
> (617) 495-7491
>
>

Chip,

  If you can't find your own copy, it is listed as Library
of Congress Catalog Number 73-600299, if that helps any. It
is a 460-page, hard cover book and sold for $8.65 in 1974 (!).
I don't know the current publication status, but I assume by
your question that it is no longer available from NIST ... yes?

Jim W6SC
jjohnson@hpl.hp.com

34. Re: [TACGPS:1264] Re: Rubidium Standards, etc.

From: "James L. Johnson" <jjjohnson@saiph.hpl.hp.com>
Date: Tue, 7 Apr 1998 08:14:44 -0800 (PDT)
To: tacgps@tapr.org
Message-ID: <199804071514.IAA11510@saiph.hpl.hp.com>
Rendered body type: text/plain

>
> James L. Johnson wrote:
> [snip]

> > almost hate to make this offer, but if somebody needs specific
> >sections of 52-2, I will photocopy them and send them out. The whole
> >app note is about 65 pages long so sending the whole thing is not
> >very practical.
>
> Jim -- It is very thoughtful of you to make this offer, but without some
> sort of index it wouldn't be too practical. I can understand why HP has
> withdrawn the document as much of it is now obsolete (I understand Loran-C
> will be phased out soon). Perhaps instead you might pass along the
> suggestion to the HP Time/Frequency Dept. that they consider publishing an
> updated edition of 52-2 with all the good basic material retained but
> including the newer techniques such as GPS.
>
> Thanks again for your offer.
>
> 73, John W4SF

John,

   What a coincidence! I emailed the guys at our Santa Clara Division
suggesting they open a project to roll all of the old app notes,
stripping out all of the obsolete information and include state-
of-the-art techniques like GPS. Let's see what happens. They do
have a nice, new app note (#1289) titled "The Science of Timekeeping",
written by Dave Allan (Allan Variance), Prof. Neil Ashby, and Dr. Cliff
Hodge. It does not contain the nuts-and-bolts information about how
to make stability measurements like app note AN52-2 does, but if one
is interested in an overall history, summary of the whys and hows of
time scales, GPS, UTC, time transfer, etc., then this is a handy
publication for education and reference. It is an 87-page paperback
pub that was released in 1997, part number 5965-7984E. There is
another note (#1272) titled: GPS and Precision Timing Applications,
but I have not picked up that one yet.

73,

Jim W6SC
jjohnson@hpl.hp.com
Hewlett-Packard Laboratories
Precision Instrumentation
Palo Alto, CA

35. Rubidium Standards, etc.

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Tue, 7 Apr 1998 12:02:42 -0400
To: "TAC-2 mail list" <tacgps@tapr.org>
Message-ID: <000001bd623e$98bd9e60$481f5c18@john.tampabay.rr.com>
Rendered body type: text/plain

James L. Johnson wrote:

>John,

> What a coincidence! I emailed the guys at our Santa Clara Division
>suggesting they open a project to roll all of the old app notes,
>stripping out all of the obsolete information and include state-
>of-the-art techniques like GPS. Let's see what happens. They do
>have a nice, new app note (#1289) titled "The Science of Timekeeping",
>written by Dave Allan (Allan Variance), Prof. Neil Ashby, and Dr. Cliff
>Hodge. It does not contain the nuts-and-bolts information about how
>to make stability measurements like app note AN52-2 does, but if one
>is interested in an overall history, summary of the whys and hows of
>time scales, GPS, UTC, time transfer, etc., then this is a handy
>publication for education and reference. It is an 87-page paperback
>pub that was released in 1997, part number 5965-7984E. There is
>another note (#1272) titled: GPS and Precision Timing Applications,
>but I have not picked up that one yet.

>73,

>Jim W6SC

Jim -- Yes, I picked up both of those documents from the HP web site
yesterday. Thanks lots for alerting me as to the existence of that site.
Lots and lots of good stuff there. I am in the process of making hard copies
now (hope my ink cartridge holds out - it is an HP 855C printer so it
wouldn't dare give up while printing an HP document, would it?

Thanks.

73, John W4SF

36. Re: [TACGPS:1267] Re: Rubidium Standards, etc.

From: "Steven R. Bible" <srbible@gate.net>
Date: Tue, 07 Apr 1998 12:27:48 -0400
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19980407122748.0086c960@pop.gate.net>
Rendered body type: text/plain

Lots of go information on App Notes, Books and the like. I can take these
and put them up on a TAPR Timing Web Page. If know of more, let the list
know and I'll keep adding them to the web page.

37. Am I missing parts?

From: "Michael St. Laurent" <rowl@earthlink.net>
Date: Tue, 07 Apr 1998 13:39:15 -0700
To: tacgps@tapr.org
Message-ID: <199804072040.NAA21318@sweden.it.earthlink.net>
Rendered body type: text/plain

I started reading the TAC-2 Operations Manual and it says I should find
among other things "A universal laptop 'brick' power supply..." Since I
found no such thing in the box I was sent does this mean my kit was missing
a part?

Michael St. Laurent
Hartwell Corporation

"Whenever you find yourself on the side of the majority
it is time to pause and reflect."
               -- Mark Twain

38. Re: [TACGPS:1265] Re: Rubidium Standards, etc.

From: "Robert L. Smith" <bobsmith@i2020.net>
Date: Wed, 08 Apr 1998 09:38:33 -0400
To: tacgps@tapr.org
Message-ID: <19980408135304.AAA11606@OZZIE>
Rendered body type: text/plain

At 08:59 AM 4/7/98 -0500, you wrote:
>
>On the subject of important technical documents now sadly out of
>print, does anybody know where I might get a hold of a copy of the
>National Bureau of Standards Monograph #140, "Time and Frequency:
>Theory and Fundamentals"?

The erstwhile National Bureau of Standards (NBS) is now the National
Institute of
Standards and Technology (NIST). I suggest you start searching at their
web site --

  http://www.boulder.nist.gov/timefreq/pubs and related web pages.

  Good Luck, de bob, wa4ypv

>
>Chip
>
>--
>
>Charles M. Coldwell
>Harvard-Smithsonian Center for Astrophysics
>60 Garden St. MS #20
>Cambridge, MA 02138
>(617) 495-7491
>
>
---- Avoid computer viruses -- Practice safe hex --------------
 * * Specializing in small, cost effective embedded control systems * *
Robert L. (Bob) Smith   Smith Machine Works, Inc.
internet   bobsmith@i2020.net   9900 Lumlay Road
landline   804/745-1065   Richmond, Virginia 23236+1004

39. Re: [TACGPS:1270] Am I missing parts?

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Wed, 08 Apr 1998 14:50:50 +0100
To: tacgps@tapr.org, "Michael St. Laurent" <rowl@earthlink.net>
Message-ID: <352B8ECA.F1821D9C@clark.net>
Rendered body type: text/plain

Michael St. Laurent wrote:
>
> I started reading the TAC-2 Operations Manual and it says I should find
> among other things "A universal laptop 'brick' power supply..." Since I
> found no such thing in the box I was sent does this mean my kit was missing
> a part?
>
> --------------------
> Michael St. Laurent
> Hartwell Corporation

Michael -- those words were from the documentation I supplied with my
original TACs that we sent from NASA/Goddard and the documentation
never got updated when we brought out the newer TAPRized TAC-2. The
same comment applies to the references on antennas and on test data.

The supplies we provided with the original TACs were 12v 2A units
sold by Mouser Electronics for ~$40. They were the small "bricks"
about 4.5" x 2" x 1.5" with a standard IEC AC power connector on one
end, and a ~6' cable on the other end, terminating in a standard
coaxial power connector with a 2.1 mm pin. But ANY power supply
that produces 10-20vDC at ~1/4 amp will work fine (including the
"wall wart" units sold at Radio Shack).

Sorry for the confusion -- Tom

40. Re: [TACGPS:1248] Rubidium Standards Available

From: Kohjin Yamada <kohjin@marina.prug.or.jp>
Date: Thu, 09 Apr 1998 00:48:14 +0900
To: tacgps@tapr.org
Message-ID: <199804081549.AAA07519@cosmos.marina.prug.or.jp>
Rendered body type: text/plain

I'm seriously interested in the FRK-L from Lehman.
Visiting their web page and wondering ...;

At 22:02 98/04/04 -0600, Tom Clark (W3IWI) wrote:
> For those who might be interested in getting a really good lab-
> quality frequency standard, Lehmann Scientific again has Ball/
> Efratom FRK 10 MHz modules available for $500.
>
> The last ones of these that I saw were over-runs from a military
> project (I believe they were used by Raytheon in the crypto module
> for Patriot missiles). They came in their sealed MIL storage packages
> and were vintage ~1988. Lehmann used to charge $800, so his new
> price shows that there is some quantity available.

Well, their price is for *USED* one not for "in their sealed MIL storage
packages".
Their web says "These USED oscillators are fully checked" for $500.
So, I understand there is $300 difference between NEW and USED.

Don't know which is the good deal.

Kohjin, JR1EDE

41. Re: [TACGPS:1270] Am I missing parts?

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Wed, 08 Apr 1998 13:52:10 -0400
To: "Michael St. Laurent" <rowl@earthlink.net>,
TACGPS Maiing List <tacgps@tapr.org>
Cc: tac@clark.net
Message-ID: <352BB94A.A0DD9C07@clark.net>
Rendered body type: text/plain

Michael St. Laurent wrote:
>
> Thanks for the response. That's not a problem then, I have a universal AC
> to DC convertor that provides up to 12v at 500 ma that I think will do the
> trick. Can you suggest a decent enclosure to put this in once it's complete?

For the original TACs and several TAC-2's I have packaged, I used

MIT (Made In Taiwan) RS232 "A/B" boxes and stripped out all the guts.
I got the versions that were designed for 9-pin connectors and that
saved the nasty problem of punching the D-connector holes. The 3/8"
front panel hole that was used for the switch became the location
for one of the lab-quality 1PPS output signals. This switch had a
small "don't twist" locator hole which was re-used for the 1PPS LED
indicator. A few simple round holes were drilled as needed in the
rear panel (DC input via a standard coaxial poer connector, the 2nd
1PPS output, antenna). The A/B switch box was spray painted to
obliterate all the old lettering. The resulting box for the original
TACs can be seen at
   ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/tac-foto.gif

The panel lettering was done with a LaserJet printer using "Repro
Film" -- 8.5" x 11" sheets of adhesive backed frosty mylar. The
details on where to get the Repro Film and the boxes used in the
original TACs are included in one of the text files on the SHOWTIME
distribution disk.

Inside the A/B box, I cut a small (~4" x 6") aluminum plate and
drilled holes suitable for mounting the PCB standoffs, a fuse holder
etc in this plate. Then this plate was glued with RTV to the lid of
the A/B switch box. This meant that no ugly holes had to be drilled
in the lid of the box.

Another mounting option is to put the TAC-2 into a 5" disk drive
frame. I have used the frames used to adapt 3" hard drives to fit
in a 5" drive bay. At one time, TAPR was going to do some mounting
brackets to make this easy, but I don't believe they ever materialized.
If you do this, note that the 4-pin power connector was designed
to be compatible with a disk drive, so your PC can power the TAC.

Another option used by a computer networking group in the Netherlands
is to put the TAC-2 onto an blank ISA computer board. This can be seen
at
     http://www.ripe.net/test-traffic/Misc/

Rick Hambly is selling built/packaged TAC-2s as the CNS CLOCK. He uses
a small commercial instrument box. In this package, he has achieved
full FCC "Class B" RFI certification. His version can be seen at
     http://www.cnssys.com

Hope these hints helped -- Tom

42. PDF -- a query

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Thu, 09 Apr 1998 14:12:22 +0100
To: TACGPS <tacgps@tapr.org>
Message-ID: <352CD746.6463B90D@clark.net>
Rendered body type: text/plain

I'd like to hear if any of you have a problem with Adobe PDF files.
In the future, I'd like to use PDF (instead of GIF or JPEG or
PostScript or Laserjet print images) to disseminate schematics,
graphs, etc.

FYI -- the way I generate PDF files is via Adobe Acrobat (not the
free reader -- the Exchange/Distiller package costing ~$200). Since
most of my day-to-day activities are in Windoze, Acrobat installs
a virtual printer that makes the files automagically.

It would also be good to hear how many people have problems if such
material is included as a MIMEd E-mail attachment (useful for small
items, but I hate it when 500 kbyte mail messages arrive unsolicited!)

73, Tom

43. RE: PDF Files

From: David Martin <drmartin@ivie.com>
Date: Thu, 09 Apr 1998 10:19:36 -0600
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980409101936.007c6960@mail.enol.com>
Rendered body type: text/plain

I really like PDF.

In my day job, I regularly need to locate technical documentation. Adobe
PDF provides a consistent format that both is easy to use and provides high
quality documents.

Everything arrives in one package. The text, the drawings, the contents, the index, and the hyper links are all together in a cross-platform package that works well for either a technical data sheet or a complete assembly document.

David Martin
WA7FFM

44. RE: [TACGPS:1275] PDF -- a query

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Thu, 9 Apr 1998 12:36:05 -0400
To: <tacgps@tapr.org>
Message-ID: <000001bd63d5$975d4d20$481f5c18@john.tampabay.rr.com>
Rendered body type: text/plain

Tom -- I have used Adobe Acrobat for quite some time without any problems at all. Everything I have downloaded in .PDF format has opened and displayed perfectly. It is a good format and the reader is FREE and widely available. I highly recommend it. The latest version of the reader is 3.01. I scan paper documents into my HP Scanjet 5p flatbed scanner and convert them directly to .PDF format with the software supplied with the 5p (Visioneer PaperPort). Most on-line catalogs and manuals are now in .PDF format so it looks like a default standard for most documents found on the Internet.

As for MIME email format, I use Outlook 98 for my email reader and it handles MIME just fine. If you send me a MIME message I will be able to read it just fine.

73, John W4SF

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Tom Clark (W3IWI)
Sent: Thursday, April 09, 1998 10:16 AM
To: tacgps@tapr.org
Subject: [TACGPS:1275] PDF -- a query

I'd like to hear if any of you have a problem with Adobe PDF files. In the future, I'd like to use PDF (instead of GIF or JPEG or PostScript or Laserjet print images) to disseminate schematics, graphs, etc.

FYI -- the way I generate PDF files is via Adobe Acrobat (not the free reader -- the Exchange/Distiller package costing ~$200). Since most of my day-to-day activities are in Windoze, Acrobat installs a virtual printer that makes the files automagically.

It would also be good to hear how many people have problems if such material is included as a MIMEd E-mail attachment (useful for small items, but I hate it when 500 kbyte mail messages arrive unsolicited!)

73, Tom

45. Re: [TACGPS:1275] PDF -- a query

From: Tom Cox <trcox@worldnet.att.net>
Date: Thu, 9 Apr 1998 11:50:29 -0400
To: tacgps@tapr.org
Message-ID: <v04003a00b1529dcd8b16@[12.66.34.132]>
Rendered body type: text/plain

At 9:15 AM -0500 4/9/98, Tom Clark (W3IWI) wrote:

>I'd like to hear if any of you have a problem with Adobe PDF files.

No problem. There is some obscure reason that .PDF files can't be opened on a Mac by the usual double-clicking on the document icon, but this is a VERY minorinconvenience. I mention it only because you might hear from someone that "the document won't open." It's necessary to open the reader application first, then use it to open the document.

>It would also be good to hear how many people have problems if such
>material is included as a MIMEd E-mail attachment.

No problem.

46. Re: [TACGPS:1278] Re: PDF -- a query

From: Dave Martindale <davem@cs.ubc.ca>
Date: Thu, 9 Apr 1998 10:12:03 -0700 (PDT)
To: tacgps@tapr.org
Message-ID: <199804091712.KAA18805@grolsch.cs.ubc.ca>
Rendered body type: text/plain

>No problem. There is some obscure reason that .PDF files can't be opened
>on a Mac by the usual double-clicking on the document icon, but this is a
>VERY minorinconvenience. I mention it only because you might hear from
>someone that "the document won't open." It's necessary to open the reader
>application first, then use it to open the document.

The problem is that the program that fetched the document (netscape is
one culprit) didn't properly map the .pdf document name extension into the
Macintosh file type and file creator codes for PDF files.

To fix this, you need to change the file type to "PDF " (note the
trailing blank) and creator code to "CARO". You can do this with
a small utility called CTC, or ResEdit, or Norton Disk Editor.
Then do a "get info" to make the Finder notice that the file has
changed. Double-clicking then works.

Or you can just start up Acrobat Reader and open the file.

        Dave

47. Re: Rubidium standards, etc.

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Thu, 9 Apr 1998 13:22:55 -0400
To: "TAC-2 mail list" <tacgps@tapr.org>
Message-ID: <000701bd63dc$221ca720$481f5c18@john.tampabay.rr.com>
Rendered body type: text/plain

Tom Clark wrote:
[snip]
>However, I have figured out a simple
>mod that brings out the control signal for external steering. FYI --
>you tweak the frequency of the Rb reference cell by adjusting the
>"C-field" magnetic field. This requires a ~0-20 ma current. [There
>is also a tweaker for the internal xtal frequency -- it is used to
>bring the xtal into the middle of the internal PLL tuning range].

Tom -- I have decided to order one of the Efratom rubidium standards to use
as a backup for my quartz standard (or maybe it will be the other way
around). I wanted to touch base and make sure I will be able to steer it
with the TOC. From your comments above it looks like it will be possible
with slight modifications to the Efratom. I will need details on how to do
this sometime down the road when the TOC materializes. But I would also like
to steer the quartz standard with the TOC at the same time. I assume the
best way to do this would be to use two TOC's, one for each standard and to
drive the two TOC's with the separate 1 PPS buffered outputs from the TAC.
Is this reasoning valid? At any rate, I would like to see a version of the
TOC that would be sophisticated enough to use with these high-precision
standards. Form the comments I have seen, it looks like there is quite of
bit of interest in the Efratom units so maybe a compatible version of the
TOC wouldn't be a bad idea.

73, John W4SF

48. Re: [TACGPS:1277] RE: PDF -- a query

From: Bob Bruninga <bruninga@nadn.navy.mil>
Date: Thu, 9 Apr 1998 15:48:43 -0400 (EDT)
To: tacgps@tapr.org
Message-ID: <Pine.SOL.3.96.980409154636.13912I-100000@arctic>
Rendered body type: text/plain

Any attached files are a pain in the @#$% for me. Unless someone tells me
its worth the trouble, and that I must see it, it goes in the bit bucket.
But then my mailer is antiquated and I recognize the need for progress.
But a 100K file to transmit only 20 lines of text is killing me. It
constantly puts me over quotas requring instant action to correct or I
dont get any more Email...

49. Re: [TACGPS:1275] PDF -- a query

From: "Ira A. Wilner" <bdcst@vermontel.com>
Date: Thu, 9 Apr 1998 16:05:47 -0500

To: "Tom Clark (W3IWI)" <tac@clark.net>, tacgps@tapr.org
Message-ID: <199804092001.QAA10799@eureka.vermontel.com>
Rendered body type: text/plain

I can handle Adobe Acrobatics. So let it fly.

--Ira (W1IRA)

--Ira A. Wilner

WILNER ASSOCIATES
Email: bdcst@vermontel.com
Web Site: http://www.vermontel.com/~bdcst

50. Re: [TACGPS:1280] Re: Rubidium standards, etc.

From: "Ira A. Wilner" <bdcst@vermontel.com>
Date: Thu, 9 Apr 1998 16:09:29 -0500
To: "John K. Pringle" <jpringle@tampabay.rr.com>, tacgps@tapr.org
Message-ID: <199804092005.QAA11361@eureka.vermontel.com>
Rendered body type: text/plain

Hello John & Tom,
I've also ordered an Efratom Rb osc. So count me in as an interested
TAC disciplined user too.

--Ira

--Ira A. Wilner

WILNER ASSOCIATES
Email: bdcst@vermontel.com
Web Site: http://www.vermontel.com/~bdcst

51. Re: [TACGPS:1280] Re: Rubidium standards, etc.

From: "Ira A. Wilner" <bdcst@vermontel.com>
Date: Thu, 9 Apr 1998 16:09:29 -0500
To: "John K. Pringle" <jpringle@tampabay.rr.com>, tacgps@tapr.org
Message-ID: <199804092005.QAA11429@eureka.vermontel.com>
Rendered body type: text/plain

Hello John & Tom,
I've also ordered an Efratom Rb osc. So count me in as an interested
TAC disciplined user too.

--Ira A. Wilner

WILNER ASSOCIATES
Email: bdcst@vermontel.com
Web Site: http://www.vermontel.com/~bdcst

52. Re: [TACGPS:1280] Re: Rubidium standards, etc.

From: "Ira A. Wilner" <bdcst@vermontel.com>
Date: Thu, 9 Apr 1998 21:44:00 -0500
To: "John K. Pringle" <jpringle@tampabay.rr.com>, tacgps@tapr.org
Message-ID: <199804100139.VAA02488@eureka.vermontel.com>
Rendered body type: text/plain

Hello John & Tom,
I've also ordered an Efratom Rb osc. So count me in as an interested
TAC disciplined user too.

--Ira

--Ira A. Wilner

WILNER ASSOCIATES
Email: bdcst@vermontel.com
Web Site: http://www.vermontel.com/~bdcst

53. Re: [TACGPS:1281] RE: PDF -- a query

From: "Ira A. Wilner" <bdcst@vermontel.com>
Date: Thu, 9 Apr 1998 21:44:00 -0500
To: Bob Bruninga <bruninga@nadn.navy.mil>, tacgps@tapr.org
Message-ID: <199804100139.VAA02495@eureka.vermontel.com>
Rendered body type: text/plain

> Date: Thu, 9 Apr 1998 14:54:32 -0500 (CDT)
> Reply-to: tacgps@tapr.org
> From: Bob Bruninga <bruninga@nadn.navy.mil>

> To: tacgps@tapr.org
> Subject: [TACGPS:1281] RE: PDF -- a query

> Any attached files are a pain in the @#$% for me. Unless someone tells me
> its worth the trouble, and that I must see it, it goes in the bit bucket.
(snip)

Bob is right to say that large attachments are not welcome on email
servers. In addition, it is very frustrating to be waiting for an
important email only to find that the first item is so large that it
will be 15 minutes before the other email messages are downloaded!

It would be nicer to provide a URL or path to the PDF file so it can
be downloaded if desired.

--Ira

54. Re: [TACGPS:1275] PDF -- a query

From: Lyle Johnson <lylej@azstarnet.com>
Date: Thu, 09 Apr 1998 18:33:16 -0700
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980409183316.0088dd90@pop.azstarnet.com>
Rendered body type: text/plain

PDF is preferred by me.

Lyle

55. Re: [TACGPS:1275] PDF -- a query

From: Robert Winingham <kc5ejk@onramp.net>
Date: Thu, 9 Apr 1998 21:33:33 -0600
To: tacgps@tapr.org
Message-ID: <v03102800b15315fed680@[206.50.201.143]>
Rendered body type: text/plain

>I'd like to hear if any of you have a problem with Adobe PDF files.
>In the future,

Works great for me and my MAC. No problem viewing and printing.
I download using the Option click and then drag and drop the document
onto an alias of Adobe Acrobat applicationthe then after I copy the file
from the desktop to my PDF storage folder I get the correct Adobe icon
file type.

 --- BUT lets not put schematics into PDF rotated 90 deg.sideways
I keep having to flip my monitor over to read them, ie the TAC-2 docs.

I would love to have the Adobe photoshop version of the schematics,
because if you do a graphics copy from a PDF document you just get a bit
map image.

I think you might be able to put less security on the
doc file and then we can extract the image and rotate back to right side
up in photoshop.

For some strange reason Adobe Acrobat draws dots on the screen before
drawing the schematics graphics and moving around at 200X takes time
to re-draw, so for that reasion I move them to PhotoShop or Canvis.

SO PDF is fine but let us edit the docs on our machines.
There are still error in the TAC-2 PDF posted on TAPR , I like to keep
a copy of the corrected data as updates take a long time.

73

Bob - Dallas,TX --- kc5ejk@onramp.net or kc5ejk@amsat.org ---

56. TAC-2 BBRAM backup power

From: Robert Winingham <kc5ejk@onramp.net>
Date: Thu, 9 Apr 1998 21:54:04 -0600
To: tacgps@tapr.org
Message-ID: <v03102801b152105b9cd2@[206.50.201.143]>
Rendered body type: text/plain

I have installed the 3.3 F cap as the backup power for my TAC-2.

Adding the 0.35 voltage drop of the diode, the 1.41 V drop of the LED
and the 0.01 V drop of the resistor I get about 3.33 volts to
the backup cap.

The GPS specification call for 2.5 to 5.5 Volts for an external
backup. That should gives me 2-3 Days of backup but I was wondering
if the LED was to be used only for the other backup options.

It seems that with the LED in place I will lose 2/3 of the backup potential
of the 3.3 F Cap

The LED only lights for the first 6 hours of the charging and slowly
dims as the voltage builds up on the CAP.

The Oncore keep alive memory drain is 10 to 50 microAmps on my
unit.

73.

Bob - Dallas,TX --- kc5ejk@onramp.net or kc5ejk@amsat.org ---

57. Re: [TACGPS:1281] RE: PDF -- a query

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Fri, 10 Apr 1998 03:19:23 +0100
To: tacgps@tapr.org
Message-ID: <352D8FBB.724AD56F@clark.net>
Rendered body type: text/plain

Bob Bruninga wrote:
>
> Any attached files are a pain in the @#$% for me. Unless someone tells me
> its worth the trouble, and that I must see it, it goes in the bit bucket.
> But then my mailer is antiquated and I recognize the need for progress.
> But a 100K file to transmit only 20 lines of text is killing me. It
> constantly puts me over quotas requring instant action to correct or I
> dont get any more Email...

Bob -- here is what I did to solve the problem of reading all the
MIME types, as well as a neat way to handle URLs embedded in the text.

My real computers are running Windoze 95 or 98 and they have Netscape
installed in them. I went to using the mailer built into Netscape
and let Netscape handle all the funny types. With Adobe Acrobat
reader installed and recognized in Netscape, even the PDF files
can be read with no human intervention needed.

In Netscape you can put the mail files anywhere you want (mine are
in a \spool\mail\ directory following the *NIX & NOS convention).
And it will handle mail files with any extensions equally easy.

The same could probably be said about Eudora, but it has the
disadvantage (to me) that the mail files MUST have a .MBX extension
(although you can configure Eudora to have them live anywhere).

Maybe somebody has a clue about the one piece I'm missing. Netscape
and Eudora are designed as clients of a separate POP mail server. My
incoming host at work is still the good old TOMCAT box running NOS,
but its POP3 capabilities don't seem to work for me. As a result,
I FTP the mail files from tomcat in lieu of using POP. I would
dearly love to have the W95/98 box be the mail server, but I have
yet to find anybody who has a W95/Winsock mail server package.
(Yes Rick -- I know I could solve this problem by changing to NT!).
If anyone knows of such a software package, please let me know.
'Tis a pity that NOS never got fully Winsocked.

73, Tom

58. Re: [TACGPS:1289] TAC-2 BBRAM backup power

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Fri, 10 Apr 1998 03:45:22 +0100
To: tacgps@tapr.org
Message-ID: <352D95D2.DAF307EC@clark.net>
Rendered body type: text/plain

Robert Winingham wrote:
>
> I have installed the 3.3 F cap as the backup power for my TAC-2.
>
> Adding the 0.35 voltage drop of the diode, the 1.41 V drop of the LED

> and the 0.01 V drop of the resistor I get about 3.33 volts to
> the backup cap.
>
> The GPS specification call for 2.5 to 5.5 Volts for an external
> backup. That should gives me 2-3 Days of backup but I was wondering
> if the LED was to be used only for the other backup options.
>
> It seems that with the LED in place I will lose 2/3 of the backup potential
> of the 3.3 F Cap
>
> The LED only lights for the first 6 hours of the charging and slowly
> dims as the voltage builds up on the CAP.
>
> The Oncore keep alive memory drain is 10 to 50 microAmps on my
> unit.

Bob -- here again we have a place where the docs and reality don't
quite match -- thanks for spotting it. Here are my recommendations:

(1) 3-cell NiCd battery with LED: Don't use D5 -- put a short across
    D5 instead, and rely on the LED to supply the diode action. This
    will give you ~3.6 volts to charge the NiCd battery. Let R6 be
    ~100 ohms to limit the charging current for a dead battery. The
    LED will start out bright, and when the battery is charged it
    will dim to almost nothing.

(2) 3-cell NiCd without LED: Leave the LED jumpered and let D5 do
    the diode deed. This will give ~4.4v to charge the NiCd, so
    R6 should be something like 360 to 470 ohms ohms to limit the
    charge current to a few ma when the batter is fully charged to
    ~4.2v

(3) 3.3F capacitor: The LED is useless -- leave it shorted. R6 only
    serves to limit the surge current when the cap is discharged,
    and ~100 ohms is fine. The Cap should charge to ~4.4v.

Part of the problem is that I added the LED only on the final Rev.C
circuit board, after most of the doc's were written. Greg & Steve are
on my case to go over the doc's with a fine-toothed comb and (to be
brutally honest!) there are other things that are more fun than
writing documentation (like a visit to the proctologist for a full
prostate screening). TAPR relies on volunteers to do all the phases
of "product development" and if any of you are good technical writers,
there is a job awaiting you --
       TAPR IS AN EQUAL OPPORTUNITY EXPLOITER

73, Tom

59. Re: [TACGPS:1288] Re: PDF -- a query

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Fri, 10 Apr 1998 03:56:47 +0100
To: tacgps@tapr.org
Message-ID: <352D987F.E95DE838@clark.net>
Rendered body type: text/plain

Robert Winingham wrote:
> [snip]
> --- BUT lets not put schematics into PDF rotated 90 deg.sideways
> I keep having to flip my monitor over to read them, ie the TAC-2 docs.

The problem here (for me) is that ORCAD puts out landscape format
drawings. If I "print" them to PDF files in portrait format, the
image is a lot smaller and the resolution is less. I've tried to
the drawings always fit a page fully. And when they are printed,
it's easier to turn the paper than a whole monitor!

I just checked in the Windoze version of Acrobat Exchange (the full-
fledged reader that allows you to edit PDF files, part of the $200
package) and it has buttons [Document][Rotate] that let me convert
Landscape to Portrait locally, with either clockwise or counter-
clockwise. You might look at your Acrobat reader controls and see
if the same switches exist there.

> I would love to have the Adobe photoshop version of the schematics,
> because if you do a graphics copy from a PDF document you just get a bit
> map image.

Sorry but I don't have a compatible version of PhotoShop, so don't
grok what the problem is.

73, Tom

60. Visio for schematics

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Fri, 10 Apr 1998 00:42:35 -0400
To: "TAC-2 mail list" <tacgps@tapr.org>
Message-ID: <000001bd643b$14d085a0$481f5c18@john.tampabay.rr.com>
Rendered body type: text/plain

Has anyone tried using Visio to draw schematics? It is very easy as the electronic symbols are already created and you just drag them onto the drawing and wire them up. You can also create your own custom symbols. The drawing can be rotated to either landscape or portrait or anything in between. I have seen some very complex schematics made with Visio.

73, John W4SF

61. Re: [TACGPS:1292] Re: PDF -- a query

From: Dave Martindale <davem@cs.ubc.ca>
Date: Thu, 9 Apr 1998 22:51:45 -0700
To: tacgps@tapr.org
Message-ID: <l03130303b15362b202d5@[198.162.38.159]>
Rendered body type: text/plain

>Robert Winingham wrote:
>> I would love to have the Adobe photoshop version of the schematics,
>> because if you do a graphics copy from a PDF document you just get a bit
>> map image.

Tom Clark wrote:
>Sorry but I don't have a compatible version of PhotoShop, so don't
>grok what the problem is.

I think the problem is that the schematics are just line drawings,
and Orcad puts them out as a series of vector drawing instructions in
Postscript form. If you send them to the Acrobat PDFwriter thingy,
they remain as vector instructions in the PDF file, and are rendered as
best they can be at whatever zoom factor you have your screen set to.
(And they are re-rendered if you change the zoom).

Photoshop only understands raster images (with a few exceptions).
So when you copy and paste stuff between Acrobat documents and Photoshop,
the document is rasterized at some fixed resolution, or maybe the current
screen resolution. When you zoom in on *that* you just see fat pixels,
not the additional detail you get in Acrobat Reader, or a Postscript
viewer like Ghostscript.

I don't think it's possible to do what I think Robert wants, since the
schematics don't actually exist as a nice high-resolution raster image.

For me, it works fine to just let Acrobat Reader rasterize the PDF,
or have Ghostscript rasterize the Postscript, and then print it.

Dave

62. Re: [TACGPS:1290] RE: PDF -- a query

From: Steve Sampson <ssampson@access.usa-site.net>
Date: Fri, 10 Apr 1998 06:14:19 -0500
To: tacgps@tapr.org
Message-ID: <352DFF0B.73307F26@access.usa-site.net>
Rendered body type: text/plain

Tom Clark (W3IWI) wrote:
>
> My real computers are running Windoze 95 or 98 and they have Netscape
> installed in them. I went to using the mailer built into Netscape
> and let Netscape handle all the funny types. With Adobe Acrobat
> reader installed and recognized in Netscape, even the PDF files
> can be read with no human intervention needed.

I use Netscape (or even Explorer) at home, and as the main mailer on
all our Unix boxes at work. The reason is, the built-in mailer
doesn't like postscript printers. Plus that CDE mailer (Common
Desktop Environment) is kind of hokey.

> Maybe somebody has a clue about the one piece I'm missing. Netscape
> and Eudora are designed as clients of a separate POP mail server. My

> incoming host at work is still the good old TOMCAT box running NOS,
> but its POP3 capabilities don't seem to work for me. As a result,
> I FTP the mail files from tomcat in lieu of using POP. I would
> dearly love to have the W95/98 box be the mail server, but I have
> yet to find anybody who has a W95/Winsock mail server package.
> (Yes Rick -- I know I could solve this problem by changing to NT!).
> If anyone knows of such a software package, please let me know.
> 'Tis a pity that NOS never got fully Winsocked.
>
> 73, Tom

Hmm, I think I used to use the POP3 without any problems. Is your
NOS so old as to have only POP2?? Anyway, I changed over to Linux
many years ago (RedHat) and that solves anybodies mail server problems.
I run my NOS on top of that :-) 16 Meg RAM and a 500 Meg drive are
my minimum mail machine candidates.

Best Regards,
Steve

63. RE: PDF -- a query

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Fri, 10 Apr 1998 07:44:02 -0400
To: <tacgps@tapr.org>
Message-ID: <000001bd6475$f542f840$101161cf@rick.cnssys.com>
Rendered body type: text/plain

Tom,

This must have been a slip of the pen. I use Linux as my POP3 mail server.

Rick
WB2TNL

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Tom Clark
(W3IWI)
Sent: Thursday, April 09, 1998 11:26 PM
To: tacgps@tapr.org
Subject: [TACGPS:1290] RE: PDF -- a query

[Snip]

(Yes Rick -- I know I could solve this problem by changing to NT!).

73, Tom

64. Re: [TACGPS:1292] Re: PDF -- a query

From: "Ira A. Wilner" <bdcst@vermontel.com>
Date: Fri, 10 Apr 1998 07:50:04 -0500
To: "Tom Clark (W3IWI)" <tac@clark.net>, tacgps@tapr.org
Message-ID: <199804101145.HAA27221@eureka.vermontel.com>
Rendered body type: text/plain

> Date: Thu, 9 Apr 1998 23:10:24 -0500 (CDT)
> Reply-to: tacgps@tapr.org
> From: "Tom Clark (W3IWI)" <tac@clark.net>
> To: tacgps@tapr.org
> Subject: [TACGPS:1292] Re: PDF -- a query

> The problem here (for me) is that ORCAD puts out landscape format
(snip)

Tom,

How about posting Orcad .dwg and Autocad .dxf files? I can read
both.

--Ira

--Ira A. Wilner

              WILNER ASSOCIATES
         Email: bdcst@vermontel.com
  Web Site: http://www.vermontel.com/~bdcst

65. Re: [TACGPS:1293] Visio for schematics

From: Lyle Johnson <lylej@azstarnet.com>
Date: Fri, 10 Apr 1998 06:50:50 -0700
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980410065050.008bc2b0@pop.azstarnet.com>
Rendered body type: text/plain

At 11:44 PM 4/9/98 -0500, you wrote:
>Has anyone tried using Visio to draw schematics? It is very easy as the
>electronic symbols are already created and you just drag them onto the
>drawing and wire them up. You can also create your own custom symbols. The
>drawing can be rotated to either landscape or portrait or anything in
>between. I have seen some very complex schematics made with Visio.

John,

The problem ws that Visio is only a graphics tool. Using a program
designed for schematic drawing, like OrCAD or Ivex or Protel, provides a
netlist of connectivity as well as packaging information, etc. If you plan
to do a PCB or even manually wire something that is more than very simple,
the embedded attributes of the schematic tools become essential.

73,

Lyle

66. RE: [TACGPS:1298] Re: Visio for schematics

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Fri, 10 Apr 1998 10:09:45 -0400
To: <tacgps@tapr.org>
Message-ID: <000101bd648a$506b0fa0$481f5c18@john.tampabay.rr.com>
Rendered body type: text/plain

Lyle -- OK. I understand the problem now. Thanks for the info. Also there
might be a problem converting Visio files to a more portable format.

73, John W4SF

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Lyle Johnson
Sent: Friday, April 10, 1998 9:54 AM
To: tacgps@tapr.org
Subject: [TACGPS:1298] Re: Visio for schematics

At 11:44 PM 4/9/98 -0500, you wrote:
>Has anyone tried using Visio to draw schematics? It is very easy as the
>electronic symbols are already created and you just drag them onto the
>drawing and wire them up. You can also create your own custom symbols. The
>drawing can be rotated to either landscape or portrait or anything in
>between. I have seen some very complex schematics made with Visio.

John,

The problem ws that Visio is only a graphics tool. Using a program
designed for schematic drawing, like OrCAD or Ivex or Protel, provides a
netlist of connectivity as well as packaging information, etc. If you plan
to do a PCB or even manually wire something that is more than very simple,
the embedded attributes of the schematic tools become essential.

73,

Lyle

67. Re: [TACGPS:1292] Re: PDF -- a query

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Fri, 10 Apr 1998 14:21:30 +0100
To: bdcst@vermontel.com
Cc: TACGPS <tacgps@tapr.org>
Message-ID: <352E2AEA.A86BF91C@clark.net>
Rendered body type: text/plain

Ira Wilner wrote:
> [snip]
> How about posting Orcad .dwg and Autocad .dxf files? I can read
> both.
>
> --Ira

Because, I think there are only one or two people who can handle them.

Also -- I'm using ORCAD FOR WINDOWS, and I haven't seen a switch
that makes .DSN files into .DXF and I don't want to spend that much
more time on trying to figure out how to produce them. It's been
quite a while since I've used either AutoCad or anything else that
works in DXF so, for me, that's not a "native language".

I'm >>TRYING<< to come up with an agreeable format that is more-or-less
universal. How about the graphs people want that I make in EXCEL or
QUATTRO or MATLAB? How about some of the VuGrafs made in PowerPoint
or MSWord?

For me, the easiest thing is to use an installed pseudo-printer that
makes a file without other intervention. So For me I've found only 4
real, viable options --
  - HP LaserJet (which loses color if the source is in color),
  - PostScript (which has always added some annoying artifacts)
  - Adobe PDF (which seems to work without a lot of problems for most
    people)
  - just give up on trying to disseminate the information (which is
    the easiest & least hassle).

So I re-ask my question of yesterday. Is there anyonewho has any real
difficulties in handling PDF files that can be generated by several
of us as a "no brainer" solution that, while it may not be perfect,
at least works?

Tom

68. RE: [TACGPS:1300] Re: PDF -- a query

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Fri, 10 Apr 1998 10:44:10 -0400
To: <tacgps@tapr.org>
Message-ID: <000301bd648f$1f998e60$101161cf@rick.cnssys.com>
Rendered body type: text/plain

Tom,

I vote for PDF files.

Rick
WB2TNL

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Tom Clark
(W3IWI)
Sent: Friday, April 10, 1998 10:25 AM
To: tacgps@tapr.org
Subject: [TACGPS:1300] Re: PDF -- a query

Ira Wilner wrote:
> [snip]
> How about posting Orcad .dwg and Autocad .dxf files? I can read
> both.
>
> --Ira

Because, I think there are only one or two people who can handle them.

Also -- I'm using ORCAD FOR WINDOWS, and I haven't seen a switch
that makes .DSN files into .DXF and I don't want to spend that much
more time on trying to figure out how to produce them. It's been
quite a while since I've used either AutoCad or anything else that
works in DXF so, for me, that's not a "native language".

I'm >>TRYING<< to come up with an agreeable format that is more-or-less
universal. How about the graphs people want that I make in EXCEL or
QUATTRO or MATLAB? How about some of the VuGrafs made in PowerPoint
or MSWord?

For me, the easiest thing is to use an installed pseudo-printer that
makes a file without other intervention. So For me I've found only 4
real, viable options --
  - HP LaserJet (which loses color if the source is in color),
  - PostScript (which has always added some annoying artifacts)
  - Adobe PDF (which seems to work without a lot of problems for most
    people)

- just give up on trying to disseminate the information (which is
the easiest & least hassle).

So I re-ask my question of yesterday. Is there anyonewho has any real
difficulties in handling PDF files that can be generated by several
of us as a "no brainer" solution that, while it may not be perfect,
at least works?

Tom

69. Re: [TACGPS:1300] Re: PDF -- a query

From: "Ira A. Wilner" <bdcst@vermontel.com>
Date: Fri, 10 Apr 1998 14:28:33 -0500
To: "Tom Clark (W3IWI)" <tac@clark.net>, tacgps@tapr.org
Message-ID: <199804101824.OAA20571@eureka.vermontel.com>
Rendered body type: text/plain

> Date: Fri, 10 Apr 1998 09:25:13 -0500 (CDT)
> Reply-to: tacgps@tapr.org
> From: "Tom Clark (W3IWI)" <tac@clark.net>
> To: tacgps@tapr.org
> Subject: [TACGPS:1300] Re: PDF -- a query

> Ira Wilner wrote:
> > [snip]
> > How about posting Orcad .dwg and Autocad .dxf files? I can read
> > both.
> >
> > --Ira
>
> Because, I think there are only one or two people who can handle them.

I was only half serious Tom. Adobe PDF is fine and very univeral
these days on the web.

--Ira

70. Re: [TACGPS:1284] Re: Rubidium standards, etc.

From: John Franke <j.m.franke@larc.nasa.gov>
Date: Fri, 10 Apr 1998 17:31:59 +0100
To: tacgps@tapr.org
Message-ID: <v03020900b153f9b58a45@[128.155.59.12]>
Rendered body type: text/plain

Hello,
I've also ordered an Efratom Rb osc. So count me in as an interested
TAC disciplined user too.

John M. Franke

71. Re: [TACGPS:1286] RE: PDF -- a query

From: "Robert L. Smith" <bobsmith@i2020.net>
Date: Sat, 11 Apr 1998 09:04:29 -0400
To: tacgps@tapr.org
Message-ID: <19980411131859.AAA21626@OZZIE>
Rendered body type: text/plain

At 08:50 PM 4/9/98 -0500, you wrote:
>> Date: Thu, 9 Apr 1998 14:54:32 -0500 (CDT)
>> Reply-to: tacgps@tapr.org
>> From: Bob Bruninga <bruninga@nadn.navy.mil>
>> To: tacgps@tapr.org
>> Subject: [TACGPS:1281] RE: PDF -- a query
>
>> Any attached files are a pain in the @#$% for me. Unless someone tells me
>> its worth the trouble, and that I must see it, it goes in the bit bucket.
>(snip)
>
>Bob is right to say that large attachments are not welcome on email
>servers. In addition, it is very frustrating to be waiting for an
>important email only to find that the first item is so large that it
>will be 15 minutes before the other email messages are downloaded!

I agree!!! Fortunately, my email reader has a "fat file" filter option
which I keep enabled at all time to protect me from being bombed with
unsolicited (and VERY unwelcome) music and video files. This places me
in the position of having to ask senders of useful/important files

to send me an advance notice so I can disable the fat file filter before
the desired file arrives.

At least one list I subscribe to has a very valuable list server feature
that allows senders to up load attachments for storage on the list server.
They are then encouraged to send a notice to the list with the filename/URL
so that users who desire the contents can download the file later.

Could such .pdf files be uploaded to the TAPR ftp area???

It seems to me that a smart list server could automatically strip all
attachments and store them in a ftp area and then attach a simple
notice to the posting advising the receipents of the availablity
of the saved attachments.

  Long live .PDF es 73 de bob, wa4ypv

>
>It would be nicer to provide a URL or path to the PDF file so it can
>be downloaded if desired.
>
>--Ira
>
>
---- Avoid computer viruses -- Practice safe hex --------------
 * * Specializing in small, cost effective embedded control systems * *
Robert L. (Bob) Smith   Smith Machine Works, Inc.
internet   bobsmith@i2020.net   9900 Lumlay Road
landline   804/745-1065   Richmond, Virginia 23236+1004

72. RE: PDF -- a query

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sat, 11 Apr 1998 09:42:49 -0400
To: <tacgps@tapr.org>
Message-ID: <000001bd654f$b7c673e0$101161cf@rick.cnssys.com>
Rendered body type: text/plain

You guys are making a big deal over nothing. Tom's pdf files have been in
the 10-40 Kb size range. I have taken 4Mb PowerPoint files for business and
put them into pdf resulting in files about 250Kb. That's an extreme case
for business, but the point is these files are just not that big and the
"picture is worth a thousand words".

Rick
WB2TNL

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Robert L.
Smith
Sent: Saturday, April 11, 1998 9:10 AM
To: tacgps@tapr.org
Subject: [TACGPS:1304] RE: PDF -- a query

At 08:50 PM 4/9/98 -0500, you wrote:
>> Date: Thu, 9 Apr 1998 14:54:32 -0500 (CDT)
>> Reply-to: tacgps@tapr.org
>> From: Bob Bruninga <bruninga@nadn.navy.mil>
>> To: tacgps@tapr.org
>> Subject: [TACGPS:1281] RE: PDF -- a query
>
>> Any attached files are a pain in the @#$% for me. Unless someone tells
me
>> its worth the trouble, and that I must see it, it goes in the bit bucket.
>(snip)
>
>Bob is right to say that large attachments are not welcome on email
>servers. In addition, it is very frustrating to be waiting for an
>important email only to find that the first item is so large that it
>will be 15 minutes before the other email messages are downloaded!

I agree!!! Fortunately, my email reader has a "fat file" filter option
which I keep enabled at all time to protect me from being bombed with
unsolicited (and VERY unwelcome) music and video files. This places me
in the position of having to ask senders of useful/important files
to send me an advance notice so I can disable the fat file filter before
the desired file arrives.

At least one list I subscribe to has a very valuable list server feature

that allows senders to up load attachments for storage on the list server.
They are then encouraged to send a notice to the list with the filename/URL
so that users who desire the contents can download the file later.

Could such .pdf files be uploaded to the TAPR ftp area???

It seems to me that a smart list server could automatically strip all
attachments and store them in a ftp area and then attach a simple
notice to the posting advising the receipents of the availablity
of the saved attachments.

  Long live .PDF es 73 de bob, wa4ypv

>
>It would be nicer to provide a URL or path to the PDF file so it can
>be downloaded if desired.
>
>--Ira
>
>
---- Avoid computer viruses -- Practice safe hex --------------
 * * Specializing in small, cost effective embedded control systems * *
Robert L. (Bob) Smith   Smith Machine Works, Inc.
internet   bobsmith@i2020.net   9900 Lumlay Road
landline   804/745-1065   Richmond, Virginia 23236+1004

73. Rubidium Standards

From: "William Post" <n6hav@pe.net>
Date: Sat, 11 Apr 1998 21:47:26 -0700
To: <tacgps@tapr.org>
Message-ID: <001101bd65ce$1a5b47a0$1ea231cf@default>
Rendered body type: text/plain

Hello,
My Efratom Rubidium oscillator arrived on Friday.
Have it up and running,

Lehman Scientific folks are great to do business with.

I also ordered, and they are in service, the great 9.95 Sony power
supplies. small very good quality.

I will be interested as a TAC disciplined user also.

Thanks

Bill Post N6HAV

74. Re: [TACGPS:1306] Rubidium Standards

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Sun, 12 Apr 1998 12:53:19 +0100
To: tacgps@tapr.org
Message-ID: <3530B93F.9EC8D919@clark.net>
Rendered body type: text/plain

William Post wrote:
>
> Hello,
> My Efratom Rubidium oscillator arrived on Friday.
> Have it up and running,
>
> Lehman Scientific folks are great to do business with.
>
> I also ordered, and they are in service, the great 9.95 Sony power
> supplies. small very good quality.
>
> I will be interested as a TAC disciplined user also.
>
> Thanks
>
> Bill Post N6HAV

Bill -- a couple of items since you are the first to report having received
the widgets:

(1) What documentation came from Lehman? Did you get the ~3/4" thick
technical manual with the unit? In particular, so that I can refer to
the manufacturer's documentation, does the book have these 2 drawings:
   - Dwg # 70516, Code ID # 55761, entitled "Synthesizer A5"

- Dwg # 70548-3, Code ID # 55761, "Wiring Diagram, Rubidium Oscillator"
The reason is to see if the material I have matches the current units.
These two dwgs are the ones that have material I need to point to on the
modifications to bring out the "C-field" tuning voltage so that the Rb
can be locked to GPS.

(2) On the Sony supplies, I presume you have noted that the supply has
the -5/-12v bonded to the case. To put 2 units in series it is necessary
to make a minor mod to the "upper supply" circuit board. I had intended to
try to find time to document the mod and how I stacked the 2 supplies RSN
(Real! Soon! Now!) but I wasn't prompted to put it higher in the queue
until you reported that you had obtained the Sony units. Anyway, beware
of the fact that the "upper" supply needs to have its outputs floated.

73, Tom

75. Re: [TACGPS:1267] Re: Rubidium Standards, etc.

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Tue, 07 Apr 1998 15:44:53 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980407154453.00793bc0@appstate.campus.mci.net>
Rendered body type: text/plain

>of-the-art techniques like GPS. Let's see what happens. They do
>have a nice, new app note (#1289) titled "The Science of Timekeeping",
>written by Dave Allan (Allan Variance), Prof. Neil Ashby, and Dr. Cliff
>Hodge. It does not contain the nuts-and-bolts information about how
>to make stability measurements like app note AN52-2 does, but if one

I was about to ask what App Note 1289 had in it. The March 1998 issue of
the IEEE Spectrum has an article on time--"Fine tuning Time in the Space
Age", pp 42-51--by Allan, Ashby, and Hodge. Interesting overview. They
list App Note 1289 as one of the refs "To probe further."

Don, W4DH

76. Re: [TACGPS:1212] Re: TOC comments

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Mon, 30 Mar 1998 02:52:49 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980330025249.00793bc0@appstate.campus.mci.net>
Rendered body type: text/plain

Tom,

Interesting plot/charts. I had a couple of questions.

At 11:40 PM 3/26/98 -0600, you wrote:
>The Ashtech units are untried. The thing that makes the ONCORE be so good is
>that it has a mode that permits you to "lock" its position (I call it the
>"zero-D" navigation mode) with all the available satellites being used to
>determine the GPS clock. This makes a BIG improvement in the timing
>performance, as can be seen in one plot on my aleph file server at URL

>   ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/oso-d270.gif

Where the plot obviously becomes much better (day 270)--What is the
situation before and after? Is this where the ONCORE is set to zero-D
mode? Big improvement!

>The 0.1 PPM value that is usually quoted refers to long-term stability (days
>to weeks). Most xtals are much better at shorter times. That's why I asked
>you to look at the typical Allan Variance curves I've compiled at URL

>   ftp://aleph.gsfc.nasa.gov/GPS/tapr_dcc/allanv.gif (or .jpg or .ps)

>where you will see I show ~1:10e7 at 1 day for what I call a "good, cheap"
xtal
>(like the Rakon). Rakon's catalog specifies < 1:10e9 @ 1 second but
>it is really better than that. On the plot, you will see that the GPS &
>cheap xtal are equal at ~100-300 seconds where they are both ~1:10e10.

As I read this chart, the Y axis shows the freq stability averaged over the
time period on the X axis. I assume the "cheap xtal" and "good xtal"
curves are for constant temp, i.e. room temp, (or was the good xtal a TCXO
or oven type?).

As I interpret the xtal + GPS curves, the "bump" (towards poorer stability)
is where the xtal may be drifting, and the GPS hasn't had a long enough
time to accumulate enough error to correct the drift.

77. TAC32 Version 1.2.1 Released

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sun, 12 Apr 1998 12:43:02 -0400
To: <tacgps@tapr.org>, <gpsdev@tapr.org>
Message-ID: <000101bd6632$0f049b40$101161cf@rick.cnssys.com>
Rendered body type: text/plain

Version 1.2.1 of the TAC32 software is now available at
http://www.cnssys.com/tac32/
Information on both TAC32 and the CNS Clock are available at
http://www.cnssys.com/

Version 1.2.1, April 12, 1998: RELEASE NOTES:

Motorola Oncore UT, UT+, GT and GT+ receivers: TAC32 now fully supports the
Motorola Oncore UT, UT+, GT and GT+ receivers (as well as the VP and 6-Pack
receivers). The receiver status line now identifies the type of Motorola
receiver detected.

The GT/UT series receivers do not report Mean Sea Level (they always report
0.00 feet) so TAC32 substitutes its own internal calculation for MSL. This
calculation is not as accurate as that included in the Oncore VP but should
be within ½ meter or so between +-80 degrees latitude.

The GT/UT series receivers do not report the full set of DOP values in
binary mode so the DOP weighting algorithm is disabled in the averaging
algorithm.

Only the Motorola Oncore VP supports the full set of features available on
the various setup screens. Unsupported features are represented by disabled
controls. The setup screens now show the correct default values for all
disabled controls, based on receiver type and mode.

Performance: Improved program efficiency, reducing CPU load by over 20%.

Display: The DGPS Status message now displays correctly. The satellite
status display format is improved by incorporating the message lines into
the underlying grid and placing the DOP messages on a separate line.

Bugs: Corrected a program failure that occurred when there were more than
12 satellites in view. This actually occurred for a few brief moments here
when I had the elevation mask set to 0 degrees.

The Timing window now correctly restores all its values the previous state
on Cancel.

Corrected an error in calculating the time zone offset value that caused the
PC-U display to show incorrect values and caused the PC Clock to be reset
every second when clock reset was based on clock error. This showed up
after the switch to Daylight Savings Time.

Rick
WB2TNL

Richard M. Hambly
CNS Systems, Inc.
(410) 987-7835
http://www.cnssys.com/

78. Re: [TACGPS:1309] Re: TOC comments

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Mon, 13 Apr 1998 03:35:29 +0100
To: tacgps@tapr.org
Message-ID: <35318801.24B5EE5E@clark.net>
Rendered body type: text/plain

Don Haselwood wrote:
>
> Tom,
>
> Interesting plot/charts. I had a couple of questions.
>
> At 11:40 PM 3/26/98 -0600, you wrote:
> >The Ashtech units are untried. The thing that makes the ONCORE be so good is
> >that it has a mode that permits you to "lock" its position (I call it the

> >"zero-D" navigation mode) with all the available satellites being used to
> >determine the GPS clock. This makes a BIG improvement in the timing
> >performance, as can be seen in one plot on my aleph file server at URL
>
> >   ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/oso-d270.gif
>
> Where the plot obviously becomes much better (day 270)--What is the
> situation before and after? Is this where the ONCORE is set to zero-D
> mode? Big improvement!

Yes -- I was at Onsala (on the western coast of sweden, about 40 km south
of Gothenburg) for another reason (outside "opponent" examiner for one of their
PhD students) and I saw they had not set up the ONCORE (actually a PVT-6)
correctly, so I did the deed at the middle of the plot -- it was running 3-D
before, and zero-D afterwards. After I changed the setup, we then spent about
an hour calibrating their cables, and you will see a small jump after those
parameters were entered into SHOWTIME. The plot then continues for the next
6 weeks in the oso-clk.gif plot, with 31 nsec RMS noise, with all the
subsequent
data in zero-D mode. As an aside, in testing the Garmin GPS-25, I find that
it's clock output is a lot more noisy in 3-D mode than it is in 2-D; the
Garmin doesn't have the zero-D option.

> >The 0.1 PPM value that is usually quoted refers to long-term stability (days
> >to weeks). Most xtals are much better at shorter times. That's why I asked
> >you to look at the typical Allan Variance curves I've compiled at URL
>
> >   ftp://aleph.gsfc.nasa.gov/GPS/tapr_dcc/allanv.gif (or .jpg or .ps)
>
> >where you will see I show ~1:10e7 at 1 day for what I call a "good, cheap"
> xtal
> >(like the Rakon). Rakon's catalog specifies < 1:10e9 @ 1 second but
> >it is really better than that. On the plot, you will see that the GPS &
> >cheap xtal are equal at ~100-300 seconds where they are both ~1:10e10.
>
> As I read this chart, the Y axis shows the freq stability averaged over the
> time period on the X axis. I assume the "cheap xtal" and "good xtal"
> curves are for constant temp, i.e. room temp, (or was the good xtal a TCXO
> or oven type?).

The Allan Variance is basically computed by taking tabular values of the time
differences between the 2 clocks. Each reading is differenced from the similar
number taken T seconds later to make a new table. Then the RMS value of the
(Time Difference Now - Time difference T seconds later) is plotted vs the
interval T. Sometimes a smooth trend is removed before the Allan Variance is
formed to remove effects of a simple frequency offset (which could be corrected
by tweaking one clock's rate). You can think of the Allan variance as being
a statistical measure of how well you can trust the frequency or time T seconds
from now compared to what it is now.

I would point out that the H-maser Allan Variance at times scales shorter than
~10 seconds reflects a "really good" xtal (costing ~$5k). For the purpose of
this plot, "cheap" meant prices in the $10-100 range, "good" xtals will cost
up to ~$1k (new prices -- many of us have been lucky at hamfests).

The xtal in the Efratom Rb is in the "pretty good" class. The physics of the
Rb standard has the xtal VFOed by a small amount at a low frequency (~100 Hz)
so that the 6+ GHz signal inside the standard sweeps around the microwave
absorption in the Rb vapor cell. When it is correct, the intensity of a light
signal dims slightly, and this optical signal is what develops the control
voltage. Because the xtal in the Rb is slightly FMed, and because the 6+GHz
resonance only causes a small change in the light level, the Rb lock actually
is degraded at short time scales from what it would be if the xtal were left
to run free. The Rb cell adds long-term stability.

Back to your question -- at short time scales, GPS is pretty noisy. For the
ONCORE, the pulse-to-pulse RMS noise from seconds to many minutes is always
a few tens of nsec. But with long-term averages, these errors smooth out.
And between times a day apart is repeatible at levels of a few tens nsec.
So the goal in any frequency disciplining is to "hand off" the servo loop
at the time when the noise levels are comparable.

In making these plots, I tried to figure out how the various oscillator
performs in a fairly carefully controlled real world. In the real world, there
is no such thing as a constant temperature. Even in an EXCELLENT oven, the
temperature can fluctuate by microdegrees. If you stuff an xtal in a thermos
bottle, you buffer against the outside environment, but there is always
some "leakage". Even an ovenized OCXO may have variations of a few tenths

of a degree. If the xtal has 1:10e9 per degC temperature variations, then
the oven temperature will cause a few parts in 10e10 frequency variations
at time of tens of minutes to an hour.

> As I interpret the xtal + GPS curves, the "bump" (towards poorer stability)
> is where the xtal may be drifting, and the GPS hasn't had a long enough
> time to accumulate enough error to correct the drift.

No -- the bump reflects the fact that when the two have equal errors, the
two "fight" and the noise can be worse than either one is individually.
Since the errors are independent of each other, the aggregate error is
something like sqrt(xtal noise**2 + GPS noise**2).

73, Tom

79. Oncore VP antenna connection

From: Doug Seyler <dseyler@neosoft.com>
Date: Sun, 12 Apr 1998 23:40:26 -0500
To: tacgps@tapr.org
Message-ID: <3531973A.21B4@neosoft.com>
Rendered body type: text/plain

I've just received an Oncore VP. It apparently has an OCX antenna
connector. How does this differ from an MCX connector? I currently have
patch antennas with BNC and SMA connectors. What are the options for
antennas for this GPS? Are adapters available to go from BNC or SMA to
OCX? Does the Garmin antenna that TAPR sells (MCX) work with this
connector? What antenna setups do people typically use for this GPS?

Thanks!

Doug Seyler
WB5TKI

80. Re: [TACGPS:1312] Oncore VP antenna connection

From: Kenneth Lerman <Kenneth.Lerman@lerman.nai.net>
Date: Mon, 13 Apr 1998 07:37:13 -0400 (EDT)
To: tacgps@tapr.org
Message-ID: <199804131137.AA28184@lerman.nai.net>
Rendered body type: text/plain

>
> I've just received an Oncore VP. It apparently has an OCX antenna
> connector. How does this differ from an MCX connector? I currently have
> patch antennas with BNC and SMA connectors. What are the options for
> antennas for this GPS? Are adapters available to go from BNC or SMA to
> OCX? Does the Garmin antenna that TAPR sells (MCX) work with this
> connector? What antenna setups do people typically use for this GPS?
>
> Thanks!
>
> Doug Seyler
> WB5TKI
>

I asked a similar question on this list a while back. I wound up
getting an antenna from Lowe and a six inch adaptor cable, also from
them.

I took the system (with a Toshiba Libretto computer and a program
called Maptitude) for its first ride in my car yesterday. Aside from
a too short battery life on the Libretto, everything worked well.

Ken

--
Kenneth Lerman   Kenneth.Lerman@lerman.nai.net
Systems Essentials Limited   Fax: (203)426-9138
55 Main Street   Voice: (203)426-4430
Newtown, CT 06470   http://lerman.nai.net/~lerman
PGP fingerprint = B1 66 29 FB CB 8C 6A 24 E1 DF B4 63 2C D6 5D AD

81. Thought/question on Rb Oscillator

From: Tom Cox <trcox@worldnet.att.net>
Date: Mon, 13 Apr 1998 09:39:21 -0400
To: tacgps@tapr.org
Message-ID: <v04003a00b157c4e4422b@[12.66.3.98]>
Rendered body type: text/plain

After I ordered the Rubidium Oscillator from Lehman Scientific, I had a
very nice note from Wade Lehman, explaining that deliveries would be
gradual (one every five days), due to his test/adjust process.

I'm wondering whether the Dr. Clark's modification invalidates the
adjustment process, which would suggest that it could be eliminated or
simplified, which would accelerate deliveries.

82. Re: [TACGPS:1312] Oncore VP antenna connection

From: Robert Winingham <kc5ejk@onramp.net>
Date: Mon, 13 Apr 1998 10:40:11 -0600
To: tacgps@tapr.org
Cc: dseyler@neosoft.com
Message-ID: <v03102801b157e9d4cf56@[206.50.200.89]>
Rendered body type: text/plain

>I've just received an Oncore VP. It apparently has an OCX antenna
>connector. How does this differ from an MCX connector? I currently have
>patch antennas with BNC and SMA connectors. What are the options for
>antennas for this GPS? Are adapters available to go from BNC or SMA to
>OCX? Does the Garmin antenna that TAPR sells (MCX) work with this
>connector? What antenna setups do people typically use for this GPS?
>

I used the TAPR antenna that comes with a MCX with my Oncore VP
but I also got a few TAPR OCX/MCX pig-tail cables to use for the short
cable run from the GPS to a bulkhead mounted BNC.

Here is a reply for Tom from last year

> I can't find any references to a OCX adapter in the catalogs.
>
-------- Tom's answer -----------
The OCX name is the Omni-Spectra proprietary designation. The more generic
series name is MCX. This is the same connector used on the GPS-20 which is
>>NEITHER<< an SMA or SMB series. The MCX/OSX connector is a push-on connector
with a shell about 1/8" in diameter. The SMA connectors have ~1/4" diameter
threaded shells. SMB/SMC connectors (one push-on, the other threaded) are
about 3/16" in diameter. The Standard SMB/SMC cable connector has a female
center pin. The MCX/OSX cable connector is a small male pin.

The TAC documentation recommends a right-angle MCX connector. Some of the
ONCORE receivers have a right-angle connector and it is a straight connector
on some ONCORE circuit boards. I recommended a right angle cable connector
so that the two circuit boards could be properly stacked together. Also,
the right-angle MCX connector is about 20 dB easier to assemble if you don't
have access to the special tools. Right angle MCX connectors are readily
available for about $5 from DIGIKEY.

73

Bob - Dallas,TX --- kc5ejk@onramp.net or kc5ejk@amsat.org ---

83. Re: [TACGPS:1312] Oncore VP antenna connection

From: "Doug McKinney" <buoy@redshift.com>
Date: Mon, 13 Apr 1998 08:53:52 -0700
To: <tacgps@tapr.org>
Message-ID: <001a01bd66f4$5dafd620$97c6cccf@buoy.mcktech.com>
Rendered body type: text/plain

-----Original Message-----
From: Doug Seyler <dseyler@neosoft.com>
To: tacgps@tapr.org <tacgps@tapr.org>
Date: Sunday, April 12, 1998 9:49 PM
Subject: [TACGPS:1312] Oncore VP antenna connection

>I've just received an Oncore VP. It apparently has an OCX antenna
>connector. How does this differ from an MCX connector? I currently have
>patch antennas with BNC and SMA connectors. What are the options for
>antennas for this GPS? Are adapters available to go from BNC or SMA to
>OCX? Does the Garmin antenna that TAPR sells (MCX) work with this
>connector? What antenna setups do people typically use for this GPS?
>
>Thanks!
>

>Doug Seyler
>WB5TKI
>
    I was waiting for Steve Bible to answer.
    The OCX and MCX are the same connector, but different manufacturers.
TAPR sells a cable which connects to the OCX and has a BNC on the other end.
I don't remember if the cable is IDed on the web, but calling TAPR will get
you the cable. If you have problems in getting them from TAPR, email me, I
also make the MCX to chassis BNC with RG174 cable, and can do it for any
length.
    There are no known OCX/MCX to BNC/SMA adapters, there is no solid
anchoring of the connector, at the OCX/MCX connector, to support an adapter.
    The Garmin and Oncore have the same OCX/MCX connectors.
    There are now many antennas that will work for both the Garmin and
Oncore. The antennas are active antennas and require 5vdc at about 20-40ma
(provided through the coax), and any antenna which needs 5vdc should work.
The antenna TAPR sells for the Oncore is an excellent antenna and is at the
low cost end for GPS antennas.
    For antenna setup you need is a full view of the sky (need to see all
the possible sats). Antenna performance can be improved with a metal ground
plane. Mag mount antennas get the ground plane from its metal contact, but
if you use the mag mount by itself, a 2" x 2" metal base plate will provide
the ground plane.

73's
Doug

84. Re: Oncore VP Antenna

From: "Douglas J. Seyler" <dseyler@mailbox.neosoft.com>
Date: Mon, 13 Apr 1998 13:34 -0500 (CDT)
To: "listserv@tapr.org" <listserv@tapr.org>,
        "tacgps@tapr.org" <tacgps@tapr.org>
Message-ID: <199804131835.NAA07093@mailbox.neosoft.com>
Rendered body type: text/plain

Thanks to everyone for the information. It appears to me that the best
solution for me is to get a couple of MCX pigtails so that I can use either
BNC or SMA chassis mounted connectors with the GPS enclosure. I have a
Matsushita patch with an SMA connector that I got a few years ago to use
with a Rockwell Navcor V, as well as a Garmin patch antenna with a BNC that
I have used with a Garmin GPS-45.

Time for another order to TAPR!

Doug Seyler
WB5TKI

85. HELP

From: "KJ O'CONNOR" <rr257@interworldnet.net>
Date: Mon, 13 Apr 1998 13:44:14 -0700
To: tacgps@tapr.org
Message-ID: <3532791C.2070C123@interworldnet.net>
Rendered body type: text/plain

What address do I use to unsubscribe? TNX, Jim

86. Re: [TACGPS:1318] HELP

From: "Steven R. Bible" <srbible@gate.net>
Date: Mon, 13 Apr 1998 05:17:41 -0400
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19980413051741.007f6de0@pop.gate.net>
Rendered body type: text/plain

At 03:46 PM 4/13/98 -0500, you wrote:
>What address do I use to unsubscribe? TNX, Jim

Send to listserv@tapr.org

in the body:

  unsub tacgps

Make sure that you use the same email address that you subscribed with.

You can also unsub from the web pages at

    http://www.tapr.org/tapr/html/sigs.html

- Steve, N7HPR
(n7hpr@tapr.org)

87. Rubidium Oscillator

From: "William Post" <n6hav@pe.net>
Date: Mon, 13 Apr 1998 14:33:10 -0700
To: <tacgps@tapr.org>
Message-ID: <000801bd6723$df9bfc20$0da231cf@default>
Rendered body type: text/plain

Hi Tom,
Sorry for the delay, Holidays etc.

First item, Yes I quickly discovered the Sony supply ground problem if used in series.

My quick and dirty fix, was to place fibre washers under the board at the screw mount locations.

Sounds like you have a better fix, like to hear about it when you have a moment.

On to the Efratom FRK.

Lehman provides a very good quality bound partial manual. It should be noted that all drawings in the manual are dated 1972, yet the unit received is newer and different in appearance.

The manual includes the following prints, but the document number box is blank.

Block diagram, Output amp schematic, several photos of unit with covers off, Servo system board, Board 2 Lamp unit, Board 3, 20 volt supply and resonator circuit. Board 4, Crystal Oscillator, Board 5 synthesizer.

These units were removed from VLF Omega Navigation systems. and have a metal plate affixed from "Global Wulfsburg Systems" of Irvine California.

These units are simply a box with a 20 place connector strip, not even a BNC for 10 MHz out.

User must build up an interface unit, Lehman provides a print for this with the usual health monitors. Rb Lamp voltmeter, Xtal control volts, Resonance lock LED, and if desired ammeter to monitor total current. a fuse 2 amp of course.
I mounted all in a cast aluminum enclosure that sets on top of the oscillator.

Lehman takes his calibration very seriously, as it should be.
His is a four day process, Day one power up, day two, calibrate unit, day three recheck, day four recheck second time, and ship unit.
They provide a calibration certificate that looks better then a marriage license hi

My unit was calibrated to -1.4x 10e-12

Hopefully I have responded to all your questions, if not email n6hav@pe.net

Thanks again for the tip on NV ad from Lehman.

Bill/N6HAV
Hemet Ca.

88. Re: [TACGPS:1319] Re: HELP

From: "KJ O'CONNOR" <rr257@interworldnet.net>
Date: Mon, 13 Apr 1998 15:18:41 -0700
To: tacgps@tapr.org
Message-ID: <35328F3F.B65078F3@interworldnet.net>
Rendered body type: text/plain

Thank you Steve--
73- Jim

Steven R. Bible wrote:

> At 03:46 PM 4/13/98 -0500, you wrote:

> >What address do I use to unsubscribe? TNX, Jim
>
> Send to listserv@tapr.org
>
> in the body:
>
>   unsub tacgps
>
> Make sure that you use the same email address that you subscribed with.
>
> You can also unsub from the web pages at
>
>   http://www.tapr.org/tapr/html/sigs.html
>
> - Steve, N7HPR
> (n7hpr@tapr.org)

89. Re: [TACGPS:1311] Re: TOC comments

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Mon, 13 Apr 1998 19:37:56 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980413193756.007ab7d0@appstate.campus.mci.net>
Rendered body type: text/plain

Tom,

Thanks for the summary...very helpful.

>data in zero-D mode. As an aside, in testing the Garmin GPS-25, I find that
>it's clock output is a lot more noisy in 3-D mode than it is in 2-D; the
>Garmin doesn't have the zero-D option.

(Since I have two of the GPS-30s), do you have a "feel" for how much
improvement accrues from setting the Garmin to 2-D mode?

>So the goal in any frequency disciplining is to "hand off" the servo loop
>at the time when the noise levels are comparable.

Are there any publications or internet sites that have writeups on
algorithms for GPS disciplining? I ran across one site (don't have it
handy at the moment--U of Mich?) that had an abstract of an article
indicating that a third order servo loop was good as it held the setting in
the absence of the sat signal.

>In making these plots, I tried to figure out how the various oscillator
>performs in a fairly carefully controlled real world.

What I interpret this to mean is that the curves are what we would expect
from a, say a "cheap" xtal (from the prices you mention, I'll add "cheap,"
i.e. $10-100, as another consideration for "my real world"), with the
environmental temp controlled (i.e. don't open the window and let the
winter wind blow on it, e.g.).

>some "leakage". Even an ovenized OCXO may have variations of a few tenths
>of a degree. If the xtal has 1:10e9 per degC temperature variations, then
>the oven temperature will cause a few parts in 10e10 frequency variations
>at time of tens of minutes to an hour.

This is the part I have been struggling with. In the tens-of-minutes
duration range it appears that in the GPS discplined OCXO situation the
frequency is almost entirely dependent on the stability of the OCXO, which
in turn is primarily dependent on the oven & temp stabiliy. I suppose that
an xtal cut so that the temp-freq inflection point matches the oven helps
considerably, but even so even a small temp variations are going to be
important. While long-term temp control is not so important as the GPS
will "steer" in a correction, the short-term temp control (or compensation)
is paramount.

I haven't seen anything on the stability of WWVB (60 Khz) signal. Since it
has not been mentioned, I assume that it is worse for disciplining an
oscillator than GPS.

73's
Don, W4DH

90. Re: [TACGPS:1320] Rubidium Oscillator

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Tue, 14 Apr 1998 05:24:54 +0100

To: tacgps@tapr.org
Message-ID: <3532F326.AB5E2706@clark.net>
Rendered body type: text/plain

William Post wrote:
>
> Hi Tom,
> Sorry for the delay, Holidays etc.
>
> First item, Yes I quickly discovered the Sony supply ground problem if used
> in series.
>
> My quick and dirty fix, was to place fibre washers under the board at the
> screw mount locations.
>
> Sounds like you have a better fix, like to hear about it when you have a
> moment.

My mods involve cutting some foil on the PCB. The insulated washers should work
just as well. I bolted the two cases side-to-side so that the metal tabs on the
base all point outwards. The IEC connector on one is removed. The Rb is mounted
on the top of the pair of cases.

> On to the Efratom FRK.
>
> Lehman provides a very good quality bound partial manual. It should be
> noted that all drawings in the manual are dated 1972, yet the unit received
> is newer and different in appearance.
>
> The manual includes the following prints, but the document number box is
> blank.
>
> Block diagram, Output amp schematic, several photos of unit with covers
> off, Servo system board, Board 2 Lamp unit, Board 3, 20 volt supply and
> resonator circuit. Board 4, Crystal Oscillator, Board 5 synthesizer.
>
> These units were removed from VLF Omega Navigation systems. and have a metal
> plate affixed from "Global Wulfsburg Systems" of Irvine California.
>
> These units are simply a box with a 20 place connector strip, not even a
> BNC for 10 MHz out.
>
> User must build up an interface unit, Lehman provides a print for this with
> the usual health monitors.   Rb Lamp voltmeter, Xtal control volts,
> Resonance lock LED, and if desired ammeter to monitor total current. a fuse
> 2 amp of course.
> I mounted all in a cast aluminum enclosure that sets on top of the
> oscillator.

Hmmmm -- it sounds like it is a somewhat different beast than the FRKs and
M-100's I have seen. They have the 5 or 10 MHz output on an SMA connector,
and the power & monitoring points come out on 5 pins of a small Amphenol
20-pin connector (they designate it as M28748-18-D10LIA).

All the drawing in my M-100 book are dated in June/July 1979, with revisions
up thru (at least) 1986. The 2 dwgs I noted earlier are important because they
show the schematic & parts location for the resistors/jumpers involved in
driving
the C-field coil that has to be tweaked to change the natural frequency of the
Rb cell.

> Lehman takes his calibration very seriously, as it should be.
> His is a four day process, Day one power up, day two, calibrate unit, day
> three recheck, day four recheck second time, and ship unit.
> They provide a calibration certificate that looks better then a marriage
> license hi
>
> My unit was calibrated to -1.4x 10e-12

Also related to this was the note from Tom Cox:
> After I ordered the Rubidium Oscillator from Lehman Scientific, I had a
> very nice note from Wade Lehman, explaining that deliveries would be
> gradual (one every five days), due to his test/adjust process.
>
> I'm wondering whether the Dr. Clark's modification invalidates the
> adjustment process, which would suggest that it could be eliminated or
> simplified, which would accelerate deliveries.

The mod that will need to be made on the Rb involves cutting one jumper
inside the case, and bringing the jumper out to the outside world. I use

two of the unused pins on the 20-pin connector mentioned above. When the pins are jumpered, the unit functions normally and all calibrations hold because you have just replaced an internal jumper with an external one.

Inside the Rb, the C-field pot simply injects a few ma into a magnetic field coil thru a series resistor. The mod lets you disble the internal pot and replace it with an external current driver.

So, except for the fact that you break the seals and go inside the unit and add a pair of wires, you do nothing to the Rb standard -- a pretty benign change!

But what worries me is that the documentation I have, and the units I'm familiar with may be different. Looks like we are going to have to exchange some documentation to see if this is a problem.

It would appear that my Dwg# 70516 = "Schematic, Synthesizer A5" (which also has a note "Board #5" in the title block) needs to be checked against your Board 5 dwg. In the upper-right-hand corner, do you show a pot=R35 and a series of resistors R36 thru R42 and terminal points E10 thru E16 going to the C-field coil connected to the resistor string at E8 & gnd at E9?

The second dwg I referred to = 70548-3 isthe assembly/wiring drawing which shows the physical location of these parts in the upper-left-hand corner of the A5 assemblt (presumably your Board #5). For additional ID, this board has 3 DIP ICs U1,U2 & U3 in the lower right-hand corner. This particular dwg in my book has an April 1983 date. FYI, the SMA connector with 10 MHz output comes off the top of the A4 Oscillator board on this assembly dwg.

Do we have any impedance match between our sets of documentation?

73, Tom

91. PS for Rubidium

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Tue, 14 Apr 1998 09:07:44 -0400
To: "TAC-2 mail list" <tacgps@tapr.org>
Message-ID: <000001bd67a6$50425b40$481f5c18@john.tampabay.rr.com>
Rendered body type: text/plain

Stacking two of the Sony 5V/12V power supplies (Marlin P. Jones Stock # 9042-PS) to power the Lehman/Efratom rubidium standards which many of us have ordered is a good economical way to power the units, provided you lift the negative lead of the top supply as has been documented by Tom and others. Marlin P. Jones also has a 28V @ 4A supply (stock #9089-PS). It has line/load regulation of .05% and should be a perfect match for the rubidiums (with no modifications) since their nominal voltage is 28V (although they work fine at 24V). They sell for $49.95, which is $30 more that using the 2 Sony supplies, but might not be a bad solution considering that when you spend $500 for the rubidium, you are only spending 10% more for a good power supply. Either power supply solution should work fine.

73, John W4SF

92. PS for Rubidium

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Tue, 14 Apr 1998 09:35:19 -0400
To: "TAC-2 mail list" <tacgps@tapr.org>
Message-ID: <000101bd67aa$2ada6920$481f5c18@john.tampabay.rr.com>
Rendered body type: text/plain

Scratch my last message. Marlin P. Jones no longer carries the 28V supply, even though they list it in their latest catalog. They do have a 24V @ 2.4A supply (stock #8773-PS) but this would probably be a little too light on current. Back to the Sony's!

Sorry for the mis-info.

73, John, W4SF

93. More on Rubidium

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Tue, 14 Apr 1998 10:23:09 -0400
To: "TAC-2 mail list" <tacgps@tapr.org>
Message-ID: <000201bd67b0$d95b8280$481f5c18@john.tampabay.rr.com>
Rendered body type: text/plain

Just ordered one of the rubidium FRK-L units from Lehman. In talking to Wade Lehman, he said there is a minor run on the units presently due to their current popularity, but there are plenty left. Each and every one is calibrated and thoroughly burned in before shipping. Orders are filled as received and orders taken today are scheduled for shipment the first or second week in May.

He said the units he sold back in 1993 (no longer available) are the ruggedized military versions but are electrically identical to the current FRK-L units. The earlier ones had the 10MHz brought out on an SMA connector, whereas the FRK-L have the output on the 20-place connector.

Thought this info might help in the discussion of the earlier vs present units.

73, John W4SF

94. Re: [TACGPS:1325] PS for Rubidium

From: "Ira A. Wilner" <bdcst@vermontel.com>
Date: Tue, 14 Apr 1998 11:48:58 -0500
To: "John K. Pringle" <jpringle@tampabay.rr.com>, tacgps@tapr.org
Message-ID: <199804141544.LAA19140@eureka.vermontel.com>
Rendered body type: text/plain

> Date: Tue, 14 Apr 1998 08:37:11 -0500 (CDT)
> Reply-to: tacgps@tapr.org
> From: "John K. Pringle" <jpringle@tampabay.rr.com>
> To: tacgps@tapr.org
> Subject: [TACGPS:1325] PS for Rubidium

> Scratch my last message. Marlin P. Jones no longer carries the 28V supply,
> even though they list it in their latest catalog. They do have a 24V @ 2.4A
> supply (stock #8773-PS) but this would probably be a little too light on
> current. Back to the Sony's!
>
> Sorry for the mis-info.
>
> 73, John, W4SF

Why is this too light? The Rb Osc. draws around 2 Amps only during warmup. Then it runs at 13 watts or 1/2 amp. That should be fine.

Isn't a linear supply that is regulated to .05% better than a switcher for oscillator stability?

I'd vote for the linear.

The pair of SONY's are a bargain. They come with cases and IEC power cord outlets and are 60 watt switchers. But they are switchers and thus have much more residual ripple and worse line/load regulation.

I have read Rb oscillator literature where they specifically tell you to use a linear supply!

Any comments Tom?

--Ira (W1IRA)

--Ira A. Wilner

WILNER ASSOCIATES
Email: bdcst@vermontel.com
Web Site: http://www.vermontel.com/~bdcst

95. Re: [TACGPS:1327] Re: PS for Rubidium

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Tue, 14 Apr 1998 16:30:14 +0100
To: tacgps@tapr.org
Message-ID: <35338F16.F3ABEEE7@clark.net>
Rendered body type: text/plain

Ira wrote:
>
> > Date: Tue, 14 Apr 1998 08:37:11 -0500 (CDT)
> > Reply-to: tacgps@tapr.org
> > From: "John K. Pringle" <jpringle@tampabay.rr.com>
> > To: tacgps@tapr.org
> > Subject: [TACGPS:1325] PS for Rubidium
>

> > Scratch my last message. Marlin P. Jones no longer carries the 28V supply,
> > even though they list it in their latest catalog. They do have a 24V @ 2.4A
> > supply (stock #8773-PS) but this would probably be a little too light on
> > current. Back to the Sony's!
> >
> > Sorry for the mis-info.
> >
> > 73, John, W4SF
>
> Why is this too light? The Rb Osc. draws around 2 Amps only during
> warmup. Then it runs at 13 watts or 1/2 amp. That should be fine.
>
> Isn't a linear supply that is regulated to .05% better than a
> switcher for oscillator stability?
>
> I'd vote for the linear.
>
> The pair of SONY's are a bargain. They come with cases and IEC power
> cord outlets and are 60 watt switchers. But they are switchers and
> thus have much more residual ripple and worse line/load regulation.
>
> I have read Rb oscillator literature where they specifically tell you
> to use a linear supply!

The innards of the Efratom Rb have a lot of filtering, so switching noise
is not an issue. The unit runs at anything from 22.5v to 32v so regulation
is not an issue. I say to use what you've got! And the Sony units are the
cheapest solution I've found. It has the additional advantage that the
"bottom" supply also gives you +12v (like to run your TAC) and +5v (like
to run any other logic you might need to supply).

If you want to do a really proper power power supply for a Rb, you want to
include a couple of amp-hours of ~24v batteries, summed with the supply
thru a pair of diodes. If you are trying to get the abslute best performance,
then you don't want to take the "hit" of a power supply dropout the next
time your power lines glitch!

73, Tom

96. Re: [TACGPS:1326] More on Rubidium

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Tue, 14 Apr 1998 16:40:00 +0100
To: tacgps@tapr.org
Message-ID: <35339160.8E308DB@clark.net>
Rendered body type: text/plain

John K. Pringle wrote:
>
> Just ordered one of the rubidium FRK-L units from Lehman. In talking to Wade
> Lehman, he said there is a minor run on the units presently due to their
> current popularity, but there are plenty left. Each and every one is
> calibrated and thoroughly burned in before shipping. Orders are filled as
> received and orders taken today are scheduled for shipment the first or
> second week in May.
>
> He said the units he sold back in 1993 (no longer available) are the
> ruggedized military versions but are electrically identical to the current
> FRK-L units. The earlier ones had the 10MHz brought out on an SMA connector,
> whereas the FRK-L have the output on the 20-place connector.
>
> Thought this info might help in the discussion of the earlier vs present
> units.

This still doesn't answer the question of whether the innards are the same
as on the M-100's.

In order to provide guidance on the differences, maybe someone could clone
a few of the manual pages of the FRK-L and send them to me. Specifically, I'd
like to see the Into & Specs(Chapter 1), Installation(Chapter 2) sections,
plus the schematics on the 5 circuit boards and the board parts layout dwg
(all these are big 11x17" sheets). [If you have a scanner, they could be
sent electronically]

73, Tom

97. Rubidium Osc.

From: "William Post" <n6hav@pe.net>
Date: Tue, 14 Apr 1998 09:47:03 -0700

To: <tacgps@tapr.org>
Message-ID: <000301bd67c5$0bb0db40$aba331cf@default>
Rendered body type: text/plain

Hi Tom,

Sorry, no match on board 5 "synthesizer"

With your permission, I will copy all drawings, or better, entire manual,
and mail it to you.
Callbook address OK?

I have an Olympus digital camera, can take photo's and send with the
manual, or if wanted sooner, can send as Email attach to your personal email
address. Assume tac@clark.net will do it.

If I can help in any other way, Please let me know

Bill/N6HAV n6hav@pe.net
Hemet Cal.

98. TAC & XNTP?

From: "Charles P. Kollar" <chuck@kollar.com>
Date: Tue, 14 Apr 1998 13:39:03 -0400 (EDT)
To: tacgps@tapr.org
Message-ID: <Pine.LNX.3.95.980414133543.11914A-100000@tc.kollar.com>
Rendered body type: text/plain

Does anyone use the TAC on a server running XNTP?

If so please give me some pointers to the correct information.
I saw nothing in the xntp list of clocks that looked like the TAC.

--thanks,
--chuck

PGP Key: Length=1024 ID=DE6BE7B1 Fingerprint=73983833689CD12E 7EECF240826346E3
PGP Key at 'http://www.kollar.com/pgp_key.html' or 'finger chuck@kollar.com'
URL: http://www.kollar.com/

99. Re: [TACGPS:1329] Re: More on Rubidium

From: "William Post" <n6hav@pe.net>
Date: Tue, 14 Apr 1998 11:43:06 -0700
To: <tacgps@tapr.org>
Message-ID: <005401bd67d5$2d05ed20$13a231cf@default>
Rendered body type: text/plain

Tom,

I have a complete (as provided to me) manual copied, all in 8.5 x 11", so
some taping will be required for the 17" prints.

Total number of 8.5"x11" pages =29
Also making Photos, of the connector detail.

I scanned a couple pages in as OCR documents, each is just over 1 meg in
size, I can send here, not a great idea, the sig cops will be a little
jumpy.

I can send them US mail Priority today, you will have them by Thursday.

Last idea Can FAX them G3-Fine if you provide a FAX number.

Let me know your pleasure.

Thanks Bill/N6HAV
-----Original Message-----
From: Tom Clark (W3IWI) <tac@clark.net>
To: tacgps@tapr.org <tacgps@tapr.org>
Date: Tuesday, April 14, 1998 10:16 AM
Subject: [TACGPS:1329] Re: More on Rubidium

>John K. Pringle wrote:
>>
>> Just ordered one of the rubidium FRK-L units from Lehman. In talking to
Wade
>> Lehman, he said there is a minor run on the units presently due to their

>> current popularity, but there are plenty left. Each and every one is
>> calibrated and thoroughly burned in before shipping. Orders are filled as
>> received and orders taken today are scheduled for shipment the first or
>> second week in May.
>>
>> He said the units he sold back in 1993 (no longer available) are the
>> ruggedized military versions but are electrically identical to the
current
>> FRK-L units. The earlier ones had the 10MHz brought out on an SMA
connector,
>> whereas the FRK-L have the output on the 20-place connector.
>>
>> Thought this info might help in the discussion of the earlier vs present
>> units.
>
>This still doesn't answer the question of whether the innards are the same
>as on the M-100's.
>
>In order to provide guidance on the differences, maybe someone could clone
>a few of the manual pages of the FRK-L and send them to me. Specifically,
I'd
>like to see the Into & Specs(Chapter 1), Installation(Chapter 2) sections,
>plus the schematics on the 5 circuit boards and the board parts layout dwg
>(all these are big 11x17" sheets). [If you have a scanner, they could be
>sent electronically]
>
>73, Tom
>

100. TAC32 Version 1.2.2 Released

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Tue, 14 Apr 1998 15:19:45 -0400
To: <tacgps@tapr.org>, <gpsdev@tapr.org>
Message-ID: <000901bd67da$48a5d180$101161cf@rick.cnssys.com>
Rendered body type: text/plain

Version 1.2.2 of the TAC32 software is now available at
http://www.cnssys.com/tac32/
Information on both TAC32 and the CNS Clock are available at
http://www.cnssys.com/

Version 1.2.2, April 14, 1998 RELEASE NOTES:

Motorola Oncore UT, UT+, GT and GT+ receivers: TAC32 now fully supports the
Motorola Oncore UT, UT+, GT and GT+ receivers (as well as the VP and 6-Pack
receivers and various Garmins).

Corrected the Eb/No readings for Motorola GT/UT series receivers in both
binary and NMEA modes. Motorola changed the rules on how these fields are
coded compared to the VP.

The receiver type is now reported in NMEA mode as well as binary mode.

Refined the default setup parameter display for the Motorola UT/GT series
receivers.

Features: Receiver Setup Screen: Separated the "Timing or DGPS" button into
"Precision Timing" and "DGPS Output" buttons with slightly different
parameter settings. The "DGPS Output" button is only enabled for receivers
with this capability.

Manual Reference Location setup screen: Simplified the screen by eliminating
the four altitude calculator buttons. Changing either Altitude(MSL) or
Altitude(WGS84) will cause the other value to be updated automatically (see
bugs, below).

Bugs: Corrected an error in calculating the qeoid-ellipsoid offset. TAC32
now calculates altitude values exactly the same way as most GPS receivers,
producing the same results.

All Motorola receivers are now initialized to zero GMT offset.

Initialization is now more intelligent so that when a different receiver
type is connected that is not compatible with the previous settings TAC32
reverts to "search" mode automatically. This is true both on startup and
when using the serial port setup screen to reinitialize.

Help Files: Updated the help files to reflect these changes and corrected
some typographical errors.

Rick
WB2TNL

Richard M. Hambly
CNS Systems, Inc.
(410) 987-7835
http://www.cnssys.com/

101. xntp help

From: "Michael St. Laurent" <rowl@earthlink.net>
Date: Tue, 14 Apr 1998 15:45:28 -0700
To: tacgps@tapr.org
Message-ID: <199804142245.PAA19654@denmark.it.earthlink.net>
Rendered body type: text/plain

I too am almost ready to connect the TAC-2 unit to our Linux time server box running xntp3-5.92. Has anyone done this already? I know you need to use the PPS signal somehow but I don't know if I should be configuring xntp to use the ATOM driver or the PPS kernel patches or both.

Michael St. Laurent
Hartwell Corporation

"Whenever you find yourself on the side of the majority
it is time to pause and reflect."
-- Mark Twain

102. Re: [TACGPS:1334] xntp help

From: "Steven R. Bible" <srbible@gate.net>
Date: Tue, 14 Apr 1998 19:34:33 -0400
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19980414193433.007ce320@pop.gate.net>
Rendered body type: text/plain

At 05:47 PM 4/14/98 -0500, you wrote:
>I too am almost ready to connect the TAC-2 unit to our Linux time server
>box running xntp3-5.92. Has anyone done this already? I know you need to
>use the PPS signal somehow but I don't know if I should be configuring xntp
>to use the ATOM driver or the PPS kernel patches or both.

I don't know if John will pipe up... perhaps he's busy.

Take a look at John's web site on GPS timing, Linux, and the TAC-2 at

http://www.febo.com

- Steve, N7HPR
(n7hpr@tapr.org)

103. TAC32 and NT 4.0 SP3

From: Steve Sampson <ssampson@access.usa-site.net>
Date: Tue, 14 Apr 1998 19:44:45 -0500
To: tacgps@tapr.org
Message-ID: <353402FD.C50A71F@access.usa-site.net>
Rendered body type: text/plain

Finally figured out what was wrong with the TAC32 software.
It won't run on my system which has Service Pack 3 installed.
Works fine with Win95 disk in the same hardware.

The particulars are an error message when viewing raw data:

ERROR while opening port - the filename, directory name,
or volume label syntax is incorrect

When looking at serial port screen, there is no COM1 or COM2
option. COM2 is available. SA Watch works fine, Showtime
works fine, but no beeps (but I didn't even expect the DOS
program to run).

I'm not an NT expert, so problems may be of my own design,
or ignorance of registry techniques.

I like the TAC32 time display set to delta from PC clock.
nice touch.

Steve

104. RE: [TACGPS:1336] TAC32 and NT 4.0 SP3

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Tue, 14 Apr 1998 21:01:34 -0400
To: <tacgps@tapr.org>
Message-ID: <000101bd680a$08b6c7c0$101161cf@rick.cnssys.com>
Rendered body type: text/plain

Steve,

TAC32 is being developed on WinNT 4.0 SP3 so that's not the problem. Do you
have a serial mouse? If so, read the help file under How to...

Rick

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Steve Sampson
Sent: Tuesday, April 14, 1998 8:47 PM
To: tacgps@tapr.org
Subject: [TACGPS:1336] TAC32 and NT 4.0 SP3

Finally figured out what was wrong with the TAC32 software.
It won't run on my system which has Service Pack 3 installed.
Works fine with Win95 disk in the same hardware.

The particulars are an error message when viewing raw data:

ERROR while opening port - the filename, directory name,
or volume label syntax is incorrect

When looking at serial port screen, there is no COM1 or COM2
option. COM2 is available. SA Watch works fine, Showtime
works fine, but no beeps (but I didn't even expect the DOS
program to run).

I'm not an NT expert, so problems may be of my own design,
or ignorance of registry techniques.

I like the TAC32 time display set to delta from PC clock.
nice touch.

Steve

105. Re: [TACGPS:1337] RE: TAC32 and NT 4.0 SP3

From: Steve Sampson <ssampson@access.usa-site.net>
Date: Tue, 14 Apr 1998 21:02:25 -0500
To: tacgps@tapr.org
Message-ID: <35341531.AAD7D989@access.usa-site.net>
Rendered body type: text/plain

Hmmm, RTFM, well looks like I went the hard way about
troubleshooting...

Be glad when you all get Linux :-)

Best Regards,

Steve

Richard M. Hambly wrote:
>
> Steve,
>
> TAC32 is being developed on WinNT 4.0 SP3 so that's not the problem. Do you
> have a serial mouse? If so, read the help file under How to...
>
> Rick

106. Re: [TACGPS:1333] TAC32 Version 1.2.2 Released

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Tue, 14 Apr 1998 22:54:23 -0500
To: tacgps@tapr.org

Message-ID: <v04003a0cb159df88cbb0@[207.8.125.50]>
Rendered body type: text/plain

TAPR also has it TAC32 page active and is taking registrations for
individual and academic users.

http://www.tapr.org/tapr/html/tac32.html

Thanks to Rick for making his software package available through TAPR.

Cheers -- Greg

>Version 1.2.2 of the TAC32 software is now available at
>http://www.cnssys.com/tac32/
>Information on both TAC32 and the CNS Clock are available at
>http://www.cnssys.com/
>

<snip>

>
>Rick
>WB2TNL
>
>Richard M. Hambly
>CNS Systems, Inc.
>(410) 987-7835
>http://www.cnssys.com/

Greg Jones, WD5IVD   Austin, Texas
wd5ivd@tapr.org   http://www.tapr.org/~wd5ivd

Boren's Laws:
        (1) When in charge, ponder.
        (2) When in trouble, delegate.
        (3) When in doubt, mumble.

107. Rubidium Oscillator

From: dave knight <knight@zko.dec.com>
Date: Wed, 15 Apr 1998 07:00:16 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980415070016.00963340@fuse.zko.dec.com>
Rendered body type: text/plain

I'm fascinated by this device, given my penchant for trying to keep highly
stable sources running well.

The big question for me is what is the likely lifetime of the Rubidium clock
that Lehman sells, given that I'd be running it continuously? 1-2 years?
5-10 years? or what?

What is the typical failure mode when they do die?

Thanks.

dave
KA1DT

108. Re: [TACGPS:1331] TAC & XNTP?

From: John Ackermann N8UR <jra@febo.com>
Date: Wed, 15 Apr 1998 09:51:40 -0400
To: tacgps@tapr.org
Message-ID: <199804151351.JAA10395@meow.febo.com>
Rendered body type: text/plain

I do. Check http://www.febo.com/ntp/ for info on my setup, and for a
patch to modify the generic nmea driver to work with the Oncore.

John N8UR
jra@febo.com

In message <Pine.LNX.3.95.980414133543.11914A-100000@tc.kollar.com>, "Charles P
. Kollar" writes:
>Does anyone use the TAC on a server running XNTP?
>
>If so please give me some pointers to the correct information.

>I saw nothing in the xntp list of clocks that looked like the TAC.
>
>--thanks,
>--chuck
>
>---
>-
>PGP Key: Length=1024 ID=DE6BE7B1 Fingerprint=73983833689CD12E 7EECF240826346E3
>PGP Key at 'http://www.kollar.com/pgp_key.html' or 'finger chuck@kollar.com'
>URL: http://www.kollar.com/

109. Re: [TACGPS:1323] Re: Rubidium Oscillator

From: John Ackermann N8UR <jra@febo.com>
Date: Wed, 15 Apr 1998 09:47:31 -0400
To: tacgps@tapr.org
Message-ID: <199804151347.JAA10304@meow.febo.com>
Rendered body type: text/plain

Hi Tom --

I have a slightly different version of the Efratom Rb unit that I picked
up at Hamvention three or four years ago. I ordered the full book on it
from Efratom. Don't remember the model numbers, etc. but will check tonight
and report back. It sounds like a very similar unit -- 3 x 4 x 5 inches,
10 MHz output, ~24 volt input. On my unit, the 10 MHz comes out on the
10 pin connector -- it's one of those SMA-in-a-shell deals. And, there's
both an internal and an external freq adjustment. The internal pot is
fairly high resistance (50k?) and you can put a 10k external pot across
it for control.

73,
John N8UR
jra@febo.com

In message <3532F326.AB5E2706@clark.net>, "Tom Clark (W3IWI)" writes:
>William Post wrote:
>>
>> Hi Tom,
>> Sorry for the delay, Holidays etc.
>>
>> First item, Yes I quickly discovered the Sony supply ground problem if used
>> in series.
>>
>> My quick and dirty fix, was to place fibre washers under the board at the
>> screw mount locations.
>>
>> Sounds like you have a better fix, like to hear about it when you have a
>> moment.
>
>My mods involve cutting some foil on the PCB. The insulated washers should wor
>k
>just as well. I bolted the two cases side-to-side so that the metal tabs on th
>e
>base all point outwards. The IEC connector on one is removed. The Rb is mounte
>d
>on the top of the pair of cases.
>
>> On to the Efratom FRK.
>>
>> Lehman provides a very good quality bound partial manual. It should be
>> noted that all drawings in the manual are dated 1972, yet the unit received
>> is newer and different in appearance.
>>
>> The manual includes the following prints, but the document number box is
>> blank.
>>
>> Block diagram, Output amp schematic, several photos of unit with covers
>> off, Servo system board, Board 2 Lamp unit, Board 3, 20 volt supply and
>> resonator circuit. Board 4, Crystal Oscillator, Board 5 synthesizer.
>>
>> These units were removed from VLF Omega Navigation systems. and have a metal
>> plate affixed from "Global Wulfsburg Systems" of Irvine California.
>>
>> These units are simply a box with a 20 place connector strip, not even a
>> BNC for 10 MHz out.
>>
>> User must build up an interface unit, Lehman provides a print for this with
>> the usual health monitors.   Rb Lamp voltmeter, Xtal control volts,
>> Resonance lock LED, and if desired ammeter to monitor total current. a fuse

>> 2 amp of course.
>> I mounted all in a cast aluminum enclosure that sets on top of the
>> oscillator.
>
>Hmmmm -- it sounds like it is a somewhat different beast than the FRKs and
>M-100's I have seen. They have the 5 or 10 MHz output on an SMA connector,
>and the power & monitoring points come out on 5 pins of a small Amphenol
>20-pin connector (they designate it as M28748-18-D10LIA).
>
>All the drawing in my M-100 book are dated in June/July 1979, with revisions
>up thru (at least) 1986. The 2 dwgs I noted earlier are important because they
>
>show the schematic & parts location for the resistors/jumpers involved in
>driving
>the C-field coil that has to be tweaked to change the natural frequency of the
>
>Rb cell.
>
>> Lehman takes his calibration very seriously, as it should be.
>> His is a four day process, Day one power up, day two, calibrate unit, day
>> three recheck, day four recheck second time, and ship unit.
>> They provide a calibration certificate that looks better then a marriage
>> license hi
>>
>> My unit was calibrated to -1.4x 10e-12
>
>Also related to this was the note from Tom Cox:
>> After I ordered the Rubidium Oscillator from Lehman Scientific, I had a
>> very nice note from Wade Lehman, explaining that deliveries would be
>> gradual (one every five days), due to his test/adjust process.
>>
>> I'm wondering whether the Dr. Clark's modification invalidates the
>> adjustment process, which would suggest that it could be eliminated or
>> simplified, which would accelerate deliveries.
>
>The mod that will need to be made on the Rb involves cutting one jumper
>inside the case, and bringing the jumper out to the outside world. I use
>two of the unused pins on the 20-pin connector mentioned above. When the
>pins are jumpered, the unit functions normally and all calibrations hold
>because you have just replaced an internal jumper with an external one.
>
>Inside the Rb, the C-field pot simply injects a few ma into a magnetic field
>coil thru a series resistor. The mod lets you disble the internal pot and
>replace it with an external current driver.
>
>So, except for the fact that you break the seals and go inside the unit and
>add a pair of wires, you do nothing to the Rb standard -- a pretty benign
>change!
>
>But what worries me is that the documentation I have, and the units I'm
>familiar with may be different. Looks like we are going to have to exchange
>some documentation to see if this is a problem.
>
>It would appear that my Dwg# 70516 = "Schematic, Synthesizer A5" (which also
>has a note "Board #5" in the title block) needs to be checked against your
>Board 5 dwg. In the upper-right-hand corner, do you show a pot=R35 and a
>series of resistors R36 thru R42 and terminal points E10 thru E16 going
>to the C-field coil connected to the resistor string at E8 & gnd at E9?
>
>The second dwg I referred to = 70548-3 isthe assembly/wiring drawing which
>shows the physical location of these parts in the upper-left-hand corner of
>the A5 assemblt (presumably your Board #5). For additional ID, this board
>has 3 DIP ICs U1,U2 & U3 in the lower right-hand corner. This particular dwg
>in my book has an April 1983 date. FYI, the SMA connector with 10 MHz output
>comes off the top of the A4 Oscillator board on this assembly dwg.
>
>Do we have any impedance match between our sets of documentation?
>
>73, Tom

110. Re: [TACGPS:1335] Re: xntp help

From: "Michael St. Laurent" <rowl@earthlink.net>
Date: Wed, 15 Apr 1998 07:46:33 -0700
To: tacgps@tapr.org
Message-ID: <199804151452.HAA05516@sweden.it.earthlink.net>
Rendered body type: text/plain

At 04:39 PM 4/14/98 , you wrote:
>At 05:47 PM 4/14/98 -0500, you wrote:

>>I too am almost ready to connect the TAC-2 unit to our Linux time server
>>box running xntp3-5.92. Has anyone done this already? I know you need to
>>use the PPS signal somehow but I don't know if I should be configuring xntp
>>to use the ATOM driver or the PPS kernel patches or both.
>
>
>I don't know if John will pipe up... perhaps he's busy.
>
>Take a look at John's web site on GPS timing, Linux, and the TAC-2 at
>
>   http://www.febo.com
>

That was just what I was looking for. Thanks!

Michael St. Laurent
Hartwell Corporation

"Whenever you find yourself on the side of the majority
it is time to pause and reflect."
               -- Mark Twain

111. Rubidium Oscillator Group Buy?

From: Tom Van Baak <tvb@veritas.com>
Date: Wed, 15 Apr 1998 10:17:03 -0700
To: tacgps@tapr.org
Message-ID: <3534EB8F.42DF@veritas.com>
Rendered body type: text/plain

Given the relatively high interest in the recent Rb
oscillator thread note that a bunch of used military
surplus Rubidium oscillators has hit the market in
the past six months or so.

In addition to Wade Lehman (Lehman Scientific) I know
that both Tom Hamilton (Hamilton Instruments) and Corby
Dawson (sales/repair of Rb and Cs standards) have used
M-100 class Rubidium oscillators in the $500 range.

I've bought lots of gear from all three of these guys
over the past few years and they are reputable and
friendly. Corby is well-known for his repair of atomic
standards. Wade and Tom each have their own used test
equipment business. Tom Hamilton has a total of about
150 units (a mix of EG&G RFS-10-7 and Ball/Efratom
M-100). Tom said his units are newer (i.e., less old)
than Wade's. Corby's lot is arriving soon.

Perhaps we could take advantage of this recent batch
of Rb oscillators and propose a TAPR group buy. Each
of the gentlemen said they would consider giving TAPR
a quantity discount.

/tvb

112. Got cable, now which end is up?

From: "Michael St. Laurent" <rowl@earthlink.net>
Date: Wed, 15 Apr 1998 14:11:38 -0700
To: tacgps@tapr.org
Message-ID: <Version.32.19980415140930.00de3500@mail.earthlink.net>
Rendered body type: text/plain

I had to get one of the Garmin GPS-20 data/power cables from TAPR
separately since one did not ship with the GPS-30PC that I bought. So,
I've got this cable with no instructions and I need to solder five of the
wires from it to the TAC-2 board. According to the TAC-2 instructions they
are:

                3 - 1PPS output
                4 - Serial Data output
                5 - Serial Data input
                8 - Ground
                10 - +5 VDC (+/- 5% at 180 mA)

The trouble I'm having is that I can't tell which end of the cable is pin
one. Can anyone help out with this?

Michael St. Laurent
Hartwell Corporation

"Whenever you find yourself on the side of the majority
it is time to pause and reflect."
               -- Mark Twain

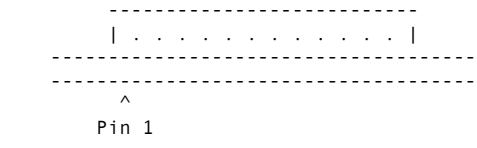
113. Re: [TACGPS:1345] Got cable, now which end is up?

From: "Steven R. Bible" <srbible@gate.net>
Date: Wed, 15 Apr 1998 17:55:39 -0400
To: tacgps@tapr.org
Cc: "Michael St. Laurent" <rowl@earthlink.net>
Message-ID: <3.0.1.32.19980415175539.0084e260@pop.gate.net>
Rendered body type: text/plain

At 04:14 PM 4/15/98 -0500, you wrote:
>I had to get one of the Garmin GPS-20 data/power cables from TAPR
>separately since one did not ship with the GPS-30PC that I bought. So,
>I've got this cable with no instructions and I need to solder five of the
>wires from it to the TAC-2 board. According to the TAC-2 instructions they
>are:
>   3 - 1PPS output
>   4 - Serial Data output
>   5 - Serial Data input
>   8 - Ground
>   10 - +5 VDC (+/- 5% at 180 mA)
>
>The trouble I'm having is that I can't tell which end of the cable is pin
>one. Can anyone help out with this?

Michael, sorry I didn't get around to answering your first email to me...

As you look into the GPS-20 connector, battery side up, pin 1 is on the left.



I took a permanent ink pin and marked a one ontop of the connector.

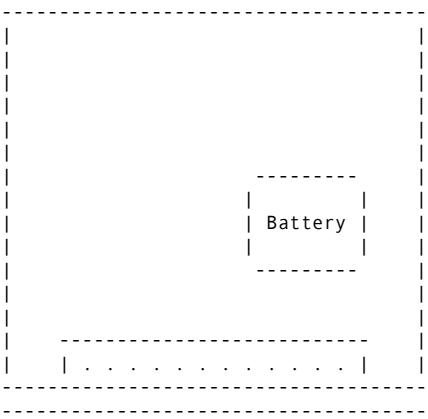
Hope this helps!

 - Steve, N7HPR
 (n7hpr@tapr.org)

114. Re: [TACGPS:1346] Re: Got cable, now which end is up?

From: "Michael St. Laurent" <rowl@earthlink.net>
Date: Wed, 15 Apr 1998 15:46:01 -0700
To: tacgps@tapr.org
Message-ID: <199804152247.PAA22897@sweden.it.earthlink.net>
Rendered body type: text/plain

I had a little trouble getting my orientation correct with the diagram you
sent, so I expanded it a little. Is it correct or did I get it backward?



```
        ^
      Pin 1

At 02:57 PM 4/15/98 , you wrote:
>At 04:14 PM 4/15/98 -0500, you wrote:
>>I had to get one of the Garmin GPS-20 data/power cables from TAPR
>>separately since one did not ship with the GPS-30PC that I bought.  So,
>>I've got this cable with no instructions and I need to solder five of the
>>wires from it to the TAC-2 board.  According to the TAC-2 instructions they
>>are:
>>              3 - 1PPS output
>>              4 - Serial Data output
>>              5 - Serial Data input
>>              8 - Ground
>>              10 - +5 VDC (+/- 5% at 180 mA)
>>
>>The trouble I'm having is that I can't tell which end of the cable is pin
>>one.  Can anyone help out with this?
>
>
>Michael, sorry I didn't get around to answering your first email to me...
>
>As you look into the GPS-20 connector, battery side up, pin 1 is on the left.
>
>       --------------------------
>       | . . . . . . . . . . . . |
>  ------------------------------------
>  ------------------------------------
>        ^
>      Pin 1
>
>I took a permanent ink pin and marked a one ontop of the connector.
>
>Hope this helps!
>
>
>
> - Steve, N7HPR
> (n7hpr@tapr.org)
>

--------------------
Michael St. Laurent
Hartwell Corporation

"Whenever you find yourself on the side of the majority
it is time to pause and reflect."
               -- Mark Twain
```

115. Rubidium Oscillators

```
From: "William Post" <n6hav@pe.net>
Date: Wed, 15 Apr 1998 16:14:23 -0700
To: <tacgps@tapr.org>
Message-ID: <003301bd68c4$3e6dbda0$c6a331cf@default>
Rendered body type: text/plain
```

Tom W3IWI,

I mailed by Postal Express Mail, the complete manual copy, and photo's This morning.

Delivery is assured for tomorrow , with no signature required.

Assumed current Callbook address OK

Thanks for the help.

Bill/N6HAV

116. Re: [TACGPS:1344] Rubidium Oscillator Group Buy?

```
From: "William Post" <n6hav@pe.net>
Date: Wed, 15 Apr 1998 16:19:40 -0700
To: <tacgps@tapr.org>
Message-ID: <003601bd68c4$fb863fc0$c6a331cf@default>
Rendered body type: text/plain
```

Tom,
That is good info. I have one unit purchased from Wade Lehman, but anticipate buying a second unit in a few days.

I know of Corby Dawson, but will appreciate a phone number or URL for
Hamilton.

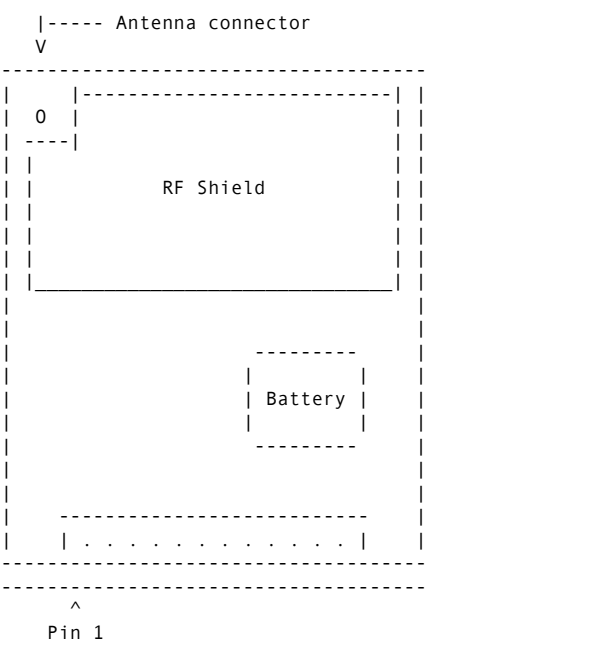
Thanks
Bill/N6HAV
-----Original Message-----
From: Tom Van Baak <tvb@veritas.com>
To: tacgps@tapr.org <tacgps@tapr.org>
Date: Wednesday, April 15, 1998 10:53 AM
Subject: [TACGPS:1344] Rubidium Oscillator Group Buy?

>Given the relatively high interest in the recent Rb
>oscillator thread note that a bunch of used military
>surplus Rubidium oscillators has hit the market in
>the past six months or so.
>
>In addition to Wade Lehman (Lehman Scientific) I know
>that both Tom Hamilton (Hamilton Instruments) and Corby
>Dawson (sales/repair of Rb and Cs standards) have used
>M-100 class Rubidium oscillators in the $500 range.
>
>I've bought lots of gear from all three of these guys
>over the past few years and they are reputable and
>friendly. Corby is well-known for his repair of atomic
>standards. Wade and Tom each have their own used test
>equipment business. Tom Hamilton has a total of about
>150 units (a mix of EG&G RFS-10-7 and Ball/Efratom
>M-100). Tom said his units are newer (i.e., less old)
>than Wade's. Corby's lot is arriving soon.
>
>Perhaps we could take advantage of this recent batch
>of Rb oscillators and propose a TAPR group buy. Each
>of the gentlemen said they would consider giving TAPR
>a quantity discount.
>
>/tvb
>

117. Re: [TACGPS:1347] Re: Got cable, now which end is up?

From: "Steven R. Bible" <srbible@gate.net>
Date: Wed, 15 Apr 1998 19:20:48 -0400
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19980415192048.007f3890@pop.gate.net>
Rendered body type: text/plain

At 05:53 PM 4/15/98 -0500, you wrote:
>I had a little trouble getting my orientation correct with the diagram you
>sent, so I expanded it a little. Is it correct or did I get it backward?
>



I added to your diagram just to make sure there are no mistakes.

How about now? :-)

I can send a photo...

 - Steve, N7HPR
 (n7hpr@tapr.org)

118. new enclosure for GPS-30

From: Bryan Mumford <bryan@bmumford.com>
Date: Wed, 15 Apr 1998 17:23:54 -0800
To: tacgps@tapr.org
Message-ID: <v03007804b15b0d4b64c4@[207.71.218.22]>
Rendered body type: text/plain

I've opened a TAPR GPS-30 to get at the GPS-20 and run extra signals out. I intend to install the device on my roof in a weatherproof enclosure. I've always been told that "everything" (like trees) will obscure a GPS signal.

What materials can I use for a weatherproof enclosure that will not impact reception? The original case looks (and melts) like ABS. What about acrylic? How thick can it be?

Bryan Mumford
Santa Barbara, California
http://www.bmumford.com

119. Altitude weighting in TAC32

From: "Alan Biddle" <APBIDDLE@worldnet.att.net>
Date: Thu, 16 Apr 1998 01:10:33 -0000
To: "TAC-BB" <tacgps@tapr.org,>
Message-ID: <000001bd68d4$74c40200$d745450c@system>
Rendered body type: text/plain

Hi,

I noticed a minor anomaly in the way TAC32 handles the altitude. It has been there for some time, and applies at least to the Garmin 20. Basically, when the unit switches to 2-D mode the current value of the altitude freezes, however with each new position update the frozen value is factored into the average value. Even with no new altitude data, the average altitude slowly converges to the last valid altitude. I suspect it doesn't matter much, since the dropouts are of short duration and probably tend to average out, but to nit-pick, the processing of the average altitude should be halted in 2-D mode.

Alan

120. Re: Rubidium Oscillator Group Buy?

From: tvb@veritas.com (Tom Van Baak)
Date: Wed, 15 Apr 98 18:31 PDT
To: tacgps@tapr.org
Message-ID: <m0yPdWm-0000FxC@megami.veritas.com>
Rendered body type: text/plain

"William Post" <n6hav@pe.net> wrote:
> Tom,
> That is good info. I have one unit purchased from Wade Lehman,
> but anticipate buying a second unit in a few days. I know of
> Corby Dawson, but will appreciate a phone number or URL for
> Hamilton.

Yes, the trouble with an atomic standard is that they
are so stable that you feel compelled to buy two of
them just to watch them drift apart (very slowly).

Tom Hamilton's business is "Hamilton Instruments". The
phone number is 760-439-1345 and the URL with his
equipment listing is:
  http://www.angelfire.com/biz/telist/index.html

At this point he's mostly selling the Efratom M-100's
rather than the much-harder-to-adjust EG&G RFS's. He
said the date codes on the M-100s are 1987 or so. Some

of them were removed from service in 1991 which implies
only 4 years of actual use.

It would be nice for you to buy one from Lehman and
one from Hamilton and report the difference, if any.

/tvb

121. RE: [TACGPS:1352] Altitude weighting in TAC32

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Wed, 15 Apr 1998 21:32:28 -0400
To: <tacgps@tapr.org>
Message-ID: <001601bd68d7$84866720$101161cf@rick.cnssys.com>
Rendered body type: text/plain

Alan,

Thanks. I hadn't thought of that. You are right and I will get the fix
into the next release.

Rick
WB2TNL

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Alan Biddle
Sent: Wednesday, April 15, 1998 9:19 PM
To: tacgps@tapr.org
Subject: [TACGPS:1352] Altitude weighting in TAC32

Hi,

I noticed a minor anomaly in the way TAC32 handles the altitude. It has
been there for some time, and applies at least to the Garmin 20. Basically,
when the unit switches to 2-D mode the current value of the altitude
freezes, however with each new position update the frozen value is factored
into the average value. Even with no new altitude data, the average
altitude slowly converges to the last valid altitude. I suspect it doesn't
matter much, since the dropouts are of short duration and probably tend to
average out, but to nit-pick, the processing of the average altitude should
be halted in 2-D mode.

Alan

122. Re: [TACGPS:1320] Rubidium Oscillator

From: Brian Chesire <BCChesire@worldnet.att.net>
Date: Wed, 15 Apr 1998 18:53:09 -0700
To: tacgps@tapr.org
Message-ID: <35356351.6247@worldnet.att.net>
Rendered body type: text/plain

Just some notes from my record book, for all interested:
  My ML100 has been in continous operation since Sept. 1993 in excess of
37,400 hours. The life was rated as 80,000 hrs. MTBF.
  I use a linear regulated supply running at 26.2 volts; current drain
is as follows:

Cold start 22 C	1750ma.	46.4 watts
6.5 Min.	1020ma	27.0 watts
15 Min.	820 ma	21.7 watts
99 Min. Steady State	697 ma	18.5 watts

 From this point on the power consumption depends on ambient temperature
and the size of the heat sink. I slightly over did the heatsink, so I
run about 18 w steady state instead of 13 w. (I haven't measured it on
one of our nice 110F days but suspect it will be a little less.)
        If I understand correctly, other than normal electronic failures, the
main mechanism for failure is the inability to vaporize enough Rb so the
lamp will light. I don't think that it runs out like a cesium tube,
which spends it whole life pumping Cs from one end to the other. The
Efratom physics package seems to be built to prvent this, there are no
cold surfaces in the two cells.

Brian WA5PPO
Tucson, AZ

123. Re: [TACGPS:1345] Got cable, now which end is up?

From: "Doug McKinney" <buoy@redshift.com>
Date: Wed, 15 Apr 1998 19:18:38 -0700

To: <tacgps@tapr.org>
Message-ID: <003f01bd68e0$848ae4e0$abc6cccf@buoy.mcktech.com>
Rendered body type: text/plain

-----Original Message-----
From: Michael St. Laurent <rowl@earthlink.net>
To: tacgps@tapr.org <tacgps@tapr.org>
Date: Wednesday, April 15, 1998 2:19 PM
Subject: [TACGPS:1345] Got cable, now which end is up?

>I had to get one of the Garmin GPS-20 data/power cables from TAPR
>separately since one did not ship with the GPS-30PC that I bought. So,
>I've got this cable with no instructions and I need to solder five of the
>wires from it to the TAC-2 board. According to the TAC-2 instructions they
>are:
> 3 - 1PPS output
> 4 - Serial Data output
> 5 - Serial Data input
> 8 - Ground
> 10 - +5 VDC (+/- 5% at 180 mA)
>
>The trouble I'm having is that I can't tell which end of the cable is pin
>one. Can anyone help out with this?

Gnd is 8 and N0. 8 is the 8th pin counting from left to right, while looking
at the connector (connector on top of PCB). To be sure, check for zero ohms
from pin 8 to GND (antenna GND will do).
73's
Doug

>
>
>--------------------
>Michael St. Laurent
>Hartwell Corporation
>
>"Whenever you find yourself on the side of the majority
>it is time to pause and reflect."
>   -- Mark Twain
>

124. Re: [TACGPS:1351] new enclosure for GPS-30

From: "Doug McKinney" <buoy@redshift.com>
Date: Wed, 15 Apr 1998 19:29:41 -0700
To: <tacgps@tapr.org>
Message-ID: <004001bd68e0$84e67260$abc6cccf@buoy.mcktech.com>
Rendered body type: text/plain

-----Original Message-----
From: Bryan Mumford <bryan@bmumford.com>
To: tacgps@tapr.org <tacgps@tapr.org>
Date: Wednesday, April 15, 1998 5:39 PM
Subject: [TACGPS:1351] new enclosure for GPS-30

>I've opened a TAPR GPS-30 to get at the GPS-20 and run extra signals out. I
>intend to install the device on my roof in a weatherproof enclosure. I've
>always been told that "everything" (like trees) will obscure a GPS signal.
>
>What materials can I use for a weatherproof enclosure that will not impact
>reception? The original case looks (and melts) like ABS. What about
>acrylic? How thick can it be?
>
>Bryan Mumford
>Santa Barbara, California
>http://www.bmumford.com
>
>

GPS signals are like radar signals, you can go through plastic, but not wet
materials like wet wood, trees and of course not through metal. If you are
in a house without metal ducting in the roof and the wood is dry, you can
have some success in getting signals, but they will not be the best. I
sometimes operate in my lab with the GPS antenna up near the wood roof and
always get satisfactory results (of course, outside antennas are much
better). So, plastic enclosures will be fine! You can always test plastics
by putting them in the microwave over for about 15 seconds. If the plastic
has any conducting properties it will get warm to hot. The less the

conducting properties the better!
73's
Doug
>

125. Re: [TACGPS:1353] Re: Rubidium Oscillator Group Buy?

From: "Doug McKinney" <buoy@redshift.com>
Date: Wed, 15 Apr 1998 19:34:48 -0700
To: <tacgps@tapr.org>
Message-ID: <004101bd68e0$858e4b20$abc6cccf@buoy.mcktech.com>
Rendered body type: text/plain

-----Original Message-----
From: Tom Van Baak <tvb@veritas.com>
To: tacgps@tapr.org <tacgps@tapr.org>
Date: Wednesday, April 15, 1998 6:41 PM
Subject: [TACGPS:1353] Re: Rubidium Oscillator Group Buy?

>"William Post" <n6hav@pe.net> wrote:
>> Tom,
>> That is good info. I have one unit purchased from Wade Lehman,
>> but anticipate buying a second unit in a few days. I know of
>> Corby Dawson, but will appreciate a phone number or URL for
>> Hamilton.
>
>Yes, the trouble with an atomic standard is that they
>are so stable that you feel compelled to buy two of
>them just to watch them drift apart (very slowly).

Ah yes, if you don't have a watch, you don't care what time it is. If you
have 2 watches, then you don't know what time it is. If you have 10 watches,
then you know how hard it is to tell time!
73's
Doug

>
>Tom Hamilton's business is "Hamilton Instruments". The
>phone number is 760-439-1345 and the URL with his
>equipment listing is:
> http://www.angelfire.com/biz/telist/index.html
>
>At this point he's mostly selling the Efratom M-100's
>rather than the much-harder-to-adjust EG&G RFS's. He
>said the date codes on the M-100s are 1987 or so. Some
>of them were removed from service in 1991 which implies
>only 4 years of actual use.
>
>It would be nice for you to buy one from Lehman and
>one from Hamilton and report the difference, if any.
>
>/tvb
>

126. Re: [TACGPS:1344] Rubidium Oscillator Group Buy?

From: Lyle Johnson <lylej@azstarnet.com>
Date: Wed, 15 Apr 1998 20:11:53 -0700
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980415201153.0089f140@pop.azstarnet.com>
Rendered body type: text/plain

>Perhaps we could take advantage of this recent batch
>of Rb oscillators and propose a TAPR group buy. Each
>of the gentlemen said they would consider giving TAPR
>a quantity discount.

If these can be used with TOC, I'm definitely interested.

Lyle

127. Re: [TACGPS:1357] Re: new enclosure for GPS-30

From: Jeff King <jeff@aerodata.net>
Date: Wed, 15 Apr 1998 23:53:17 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980415235317.03cef2e0@aerodata.net>
Rendered body type: text/plain

At 09:46 PM 4/15/98 -0500, Doug McKinney wrote:
>GPS signals are like radar signals, you can go through plastic, but not wet
>materials like wet wood, trees and of course not through metal. If you are
>in a house without metal ducting in the roof and the wood is dry, you can
>have some success in getting signals, but they will not be the best.

I've got a interesting profile of many of the trees in my backyard
using the observed GPS horizon from SAWatch. The garage (dry) is
largely invisible.

> You can always test plastics
>by putting them in the microwave over for about 15 seconds. If the plastic
>has any conducting properties it will get warm to hot.

I can attest to this as well. A bunch of RF Phd's at TRW were perplexed why
there radio transceiver (a RKE) didn't have very good range. A quick pop
of the prototype plastic case into the microwave oven in the lunchroom
turned up the problem that they had agonized over for weeks.

Sometimes "low-tech" is the quickest answer.

-Jeff

| Jeff King   Aero Data Systems |
| jeff@mich.com P.O. Box 510895 |
| (248)471-1787 Livonia, MI 48151 |
|F(248)471-0279 United States |
----

128. Re: [TACGPS:1348] Rubidium Oscillators

From: clark@tomcat.gsfc.nasa.gov
Date: Thu, 16 Apr 98 05:09:42 UTC
To: tacgps@tapr.org
Cc: tacgps@tapr.org
Message-ID: <58620@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Thanks Bill -- address in callbook is OK for nearly 20 years.

73, Tom

129. Re: [TACGPS:1348] Rubidium Oscillators

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Thu, 16 Apr 1998 05:41:18 +0100
To: tacgps@tapr.org
Message-ID: <353599FE.BC7F7A33@clark.net>
Rendered body type: text/plain

With all the interest in the Rb standards, Sony supplies, etc --
Is there any interest in my posting a GIF photo of my Efratom
M100 mounted on the ganged Sony supplies?

Tom

130. Re: [TACGPS:1362] Re: Rubidium Oscillators

From: Tom Cox <trcox@worldnet.att.net>
Date: Thu, 16 Apr 1998 06:45:44 -0400
To: tacgps@tapr.org
Message-ID: <v04003a00b15b918385ca@[12.66.3.199]>
Rendered body type: text/plain

At 12:47 AM -0500 4/16/98, Tom Clark (W3IWI) wrote:

>Is there any interest in my posting a GIF photo of my Efratom
>M100 mounted on the ganged Sony supplies?

Yes, please. But don't you think we should first have a lengthy discussion
of the suitability of GIF files for data exchange?

131. PS for Rubidium

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Thu, 16 Apr 1998 09:25:15 -0400
To: "TAC-2 mail list" <tacgps@tapr.org>
Message-ID: <000001bd693b$17ba1560$481f5c18@john.tampabay.rr.com>
Rendered body type: text/plain

For anyone interested in going the linear route for a Rb power supply. M.P. Jones currently has 83 of the 24v. 2.4A. supplies in stock (stock #8773-PS). These are new, in factory cartons with data sheet. The regulation is .05% load/line, they have over-voltage/over-current protection and remote sensing capability. The output is floating so you can have either +24. or -24v. or they can be easily stacked for higher voltage. I have mine running my quartz standard which draws ~1.8A. on startup then settles to ~.5A. after ~10 min. Runs very cool. Will order another one for my Rb. They cost $39.95, twice the price of the 2 Sony's. Just another PS option.

73, John W4SF

132. Re: [TACGPS:1363] Re: Rubidium Oscillators

From: Kenneth Lerman <Kenneth.Lerman@lerman.nai.net>
Date: Thu, 16 Apr 1998 09:30:32 -0400 (EDT)
To: tacgps@tapr.org
Message-ID: <199804161330.AA17150@lerman.nai.net>
Rendered body type: text/plain

>
> At 12:47 AM -0500 4/16/98, Tom Clark (W3IWI) wrote:
>
> >Is there any interest in my posting a GIF photo of my Efratom
> >M100 mounted on the ganged Sony supplies?
>
> Yes, please. But don't you think we should first have a lengthy discussion
> of the suitability of GIF files for data exchange?
>
>
>

I suspect a better thing to do would be to put it on a web page which we can access as we wish. That way those of us who pay for mail by the byte and who have no interest won't pay for something we don't want.

Ken

--
Kenneth Lerman   Kenneth.Lerman@lerman.nai.net
Systems Essentials Limited   Fax: (203)426-9138
55 Main Street   Voice: (203)426-4430
Newtown, CT 06470   http://lerman.nai.net/~lerman
PGP fingerprint = B1 66 29 FB CB 8C 6A 24 E1 DF B4 63 2C D6 5D AD

133. Re: [TACGPS:1350] Re: Got cable, now which end is up?

From: "Michael St. Laurent" <rowl@earthlink.net>
Date: Thu, 16 Apr 1998 08:05:10 -0700
To: tacgps@tapr.org
Message-ID: <199804161511.IAA12663@italy.it.earthlink.net>
Rendered body type: text/plain

At 04:25 PM 4/15/98 , you wrote:
>I added to your diagram just to make sure there are no mistakes.
>
>How about now? :-)
>
>I can send a photo...

No photo required. Thanks for the assist! :-)

Michael St. Laurent
Hartwell Corporation

"Whenever you find yourself on the side of the majority
it is time to pause and reflect."
               -- Mark Twain

134. GPS-30 needs its blanky

From: Bryan Mumford <bryan@bmumford.com>
Date: Thu, 16 Apr 1998 08:33:26 -0800
To: tacgps@tapr.org
Message-ID: <v03007802b15be1212b13@[207.71.218.217]>
Rendered body type: text/plain

Thanks all for the tips on making a new enclosure for the GPS20 inside a GPS30.

Last night I left the unit outside in a thin plastic box that was
originally made to hold nails. I was running my diagnostic software that
records each time the satellite link is lost and how long the loss lasts.
This morning I found that the receiver was inoperative for almost the
entire night. I removed the thin plastic box and placed a folder towel over
the exposed receiver. Within a few minutes it had 5 satellites. I removed
the towel and within 10 seconds it had no satellites. Replace the towel and
within 10 seconds it has 5 satellites.

I was told that some of these GPS30 units were sensitive to temperature,
but jeez -- can it respond to temperature that fast? (It heats itself with
the onboard regulator.) It appears that a new enclosure must be a thermal
insulator too.

The soldering on the shielding looks just fine and solid. Does anyone have
experience with improving the behavior of these TAPR GPS30 units?

Bryan Mumford
Santa Barbara, California
http://www.bmumford.com

135. W3IWI M100 Rubidium setup

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Thu, 16 Apr 1998 16:43:33 +0100
To: tacgps@tapr.org
Message-ID: <35363535.BDD10E37@clark.net>
Rendered body type: text/plain

OK -- a couple of people said they would like to see the photos
of my mounting of an M-100 with the Sony power supplies. To avoid
the WOG (Wrath Of God) comments about attached files, take a look
at my aleph file server at URL

   ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/rube/

where you will find 5 GIF images. These were taken with a Kodak
DC120 camera, then cropped & converted to GIF using CPIC 32.

SONY PHOTOS:
The sony_box.gif photo shows how I bolted two of the Sony power
supply boxes together. The power connector & switch on one of the
two has been removed.

The sony_box photo shows that the two boxes are mounted in opposite
directions with the bolt-don mounting holes pointing outward. The
sony_box photo doesn't show it too well, but I added a 1/2" hole in
the middle of the facing walls of the two power supplies so that
wires could run between the two boxes. 4 of the existing vent holes
are used for 4-40 screws to bolt the cases together. Some super glue
on the wall between the 2 boxes also helps to stiffen the assembly
(I use super glue a lot in such projects -- it can save a lot of
work making up special brackets).

The sony_pcb.gif photo shows the one mod you need to make to one
of the two circuit boards (the "upper" supply). The Sony supply
has the -5/-12v lines tied to frame ground at two of the mounting
pads. I did some foil cutting to isolate the two mounting pads
and used wires to re-eastable continuity. The left-hand board in
the photo shows the modified board while the right-hand board is
the virgin "lower" unit. The added white jumper show up well, and
if you look closely you can see where the PCB traces were cut to
isolate the mounting screws.

RUBE PHOTOS:
The three Rube photos are 3 different views of the assembled M100/
Sony. The M100 needs a heat sink and must run at T<68 degC. The
mounting bracket bolted to the top of the Sony assembly is a 5" x
10" piece of 1/8" thick aluminum bent into a right-angle bracket.
It is mounted to the top of the Sonys by 4 screws -- the two
existing top screws, plus two 6-32s near the bend in the bracket.
The nuts for the two 6-32 screws are epoxied to the Sony supply
lids since they are "blind" when assembled.

On Rube photos #1 & #3 you will see that I have added a 12-wire
Euro-style nylon terminal strip for the DC power output. 6 wires

are in use at present, for +5, +13 & +26v outputs and gnds. There
are 3 LEDs above the connector to show when the supplies are on.

The +5/+13 Sony supply is on the right in the these photos, and the
+26v supply is on the left. Also emerging from the box is a 2.1mm
coax power plug that takes +12v to a TAC. Power to the M100 is on
the twisted pair coming thru the lid of the right-hand Sony.

The wires from the pwr supply to the terminal strip use the existing
ventilation holes. A small piece of PCB stock is under the terminal
strip to serve as a ground and also as a shim spacer. The LEDs
mount thru existing vent holes and holes in this PCB stock, and
are held in place with super glue. The +5 & +12 LEDs are connected
to the small (removable) output connectors. The +24v LED is tied
across the "upper" supply (of course, the LEDs have series current
limiting resistors = 510 ohms for the +5v LED and = 2kohms for the
other two (each of which sees 13v).

Photos 2&3 show the mechanical mounting of the M100 to the right-
angle bracket. You will note that an extra heat-sink is added
to the mounting end -- this was found in the junk box and just
happened to be about the correct size. The purpose of the heavy
aluminum bracket and the added heat sink is to get rid of the
15-20 watts of heat generated by the Rb. Efratom specifies that
the absolute maximum temperature of the baseplate is 68 degC
(an untouchable 154 degF). My advice is that if your rube is
so hot that you can't touch it, it's too hot!

In my installation, the heat sink you see in these photos keeps
the baseplate temperature at ~45 degC (~115 degF), warm to the
touch, but you can keep your hand on it all day.

When I get it wired, the assembly will also include a 10 MHz =>
1PPS divider for time comparison with a TAC which will go in the
~2" x5" space on the top of the Sony supplies above the terminal
strip. The unused 6 terminals on the Euro-style power strip will
go to an external ~24v battery to buffer against brief AC power
failures (probably 2 small 12v NiCd batteries). The battery will
be float charged from the Sony supplies with steering diodes so
that the battery has no load until the AC goes away.

FYI - The pair of $10 Sony switching supplies replaced a Big! Kludge!
rack mounted linear lab supply weighing ~50 lbs. IMHO, finding the
the Sonys was a big step forward -- now I can pick the assembly up
with one hand!

Hope these hints & photos helped -- 73, Tom

136. Re: [TACGPS:1367] GPS-30 needs its blanky

From: Steve Bennett <swben@ricochet.net>
Date: Thu, 16 Apr 1998 09:47:40 -0700
To: tacgps@tapr.org
Message-ID: <3536362C.1198@ricochet.net>
Rendered body type: text/plain

Howdy Bryan;

The GPS-30 does need a little covering to feel right! I removed the
cover from my GPS-30 and had the same trouble you did, no satellites. I
suspected the patch antenna, with its high dielectric constant
substrate, was rather sensitive to its environment. I removed the
antenna and its sheet metal bracket and took a quick trip to the network
analizer at work. The antenna was quite sensitive to the case being on
or off. With the case off the "dip" was out of band.

I now have the reciver working in a little box of its own and the
antenna is in its case with an MAR-6 amp soldered to the underside and a
great wad of silicone seal holding the thing togeather.

I had to put a small inductor inside one of the cans on the reciver to
bring out the power for the amp. It seems to work well enough.

Steve Bennett

137. Re: [TACGPS:1326] More on Rubidium

From: "Robert L. Smith" <bobsmith@i2020.net>
Date: Thu, 16 Apr 1998 14:48:37 -0400
To: tacgps@tapr.org

Message-ID: <19980416190318.AAA8643@OZZIE>
Rendered body type: text/plain

At 09:29 AM 4/14/98 -0500, you wrote:
>Just ordered one of the rubidium FRK-L units from Lehman. In talking to Wade
>Lehman, he said there is a minor run on the units presently due to their
>current popularity, but there are plenty left. Each and every one is
>calibrated and thoroughly burned in before shipping. Orders are filled as
>received and orders taken today are scheduled for shipment the first or
>second week in May.
>

How good are these units without TACTOC stabilization. Looking for
a pretty good freq standard for my lab, but don't want to get into the
gps businisess at this time. After Lehman calibrates them what is their
initial accuracy and expected drift rate? I am looking for overall
accuracy in the 1e-7 to 1e-8 range. How long would one of these stay in
that range after purchase??

  TIA es 73, de bob, wa4ypv

>He said the units he sold back in 1993 (no longer available) are the
>ruggedized military versions but are electrically identical to the current
>FRK-L units. The earlier ones had the 10MHz brought out on an SMA connector,
>whereas the FRK-L have the output on the 20-place connector.
>
>Thought this info might help in the discussion of the earlier vs present
>units.
>
>73, John W4SF
>
>
>
---- Avoid computer viruses -- Practice safe hex --------------
 * * Specializing in small, cost effective embedded control systems * *
Robert L. (Bob) Smith   Smith Machine Works, Inc.
internet   bobsmith@i2020.net   9900 Lumlay Road
landline   804/745-1065   Richmond, Virginia 23236+1004

138. Re: W3IWI M100 Rubidium setup

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Thu, 16 Apr 1998 19:55:29 +0100
To: TACGPS <tacgps@tapr.org>
Message-ID: <35366231.39A8CE09@clark.net>
Rendered body type: text/plain

I added one more photo on aleph -- sony_cut.gif is an expanded
version of the trace cuts & jumpers that are needed for the
"upper" supply -- so there are now 6 photos.

73, Tom

139. Re: [TACGPS:1370] Re: More on Rubidium

From: tvb@veritas.com (Tom Van Baak)
Date: Thu, 16 Apr 98 14:10 PDT
To: tacgps@tapr.org
Message-ID: <m0yPvvF-0000FfC@megami.veritas.com>
Rendered body type: text/plain

"Robert L. Smith" <bobsmith@i2020.net> wrote:
>
> How good are these units without TACTOC stabilization.
> Looking for a pretty good freq standard for my lab, but
> don't want to get into the gps businisess at this time.
> After Lehman calibrates them what is their initial accuracy
> and expected drift rate? I am looking for overall accuracy
> in the 1e-7 to 1e-8 range. How long would one of these stay
> in that range after purchase??
>
> TIA es 73, de bob, wa4ypv

Initial accuracy is within 1e-11 for sure. Drift rate is
a few parts in 10^11 per month depdending on the unit.
Ignoreing other effects, it will remain frequency accurate
to 1e-7 or 1e-8 for roughly a thousand months (~80 years).
Nice, eh?

In fact, I would guess that many people would be happy
spending $500 for such a Rb standard and avoid TAC, TOC,

GPS, and further discussions on which OCXO to buy entirely.

/tvb

140. Re: [TACGPS:1368] W3IWI M100 Rubidium setup

From: "Ira A. Wilner" <bdcst@vermontel.com>
Date: Thu, 16 Apr 1998 20:26:29 -0500
To: "Tom Clark (W3IWI)" <tac@clark.net>, tacgps@tapr.org
Message-ID: <199804170021.UAA17785@eureka.vermontel.com>
Rendered body type: text/plain

> Date: Thu, 16 Apr 1998 12:00:55 -0500 (CDT)
> Reply-to: tacgps@tapr.org
> From: "Tom Clark (W3IWI)" <tac@clark.net>
> To: tacgps@tapr.org
> Subject: [TACGPS:1368] W3IWI M100 Rubidium setup

> OK -- a couple of people said they would like to see the photos
> of my mounting of an M-100 with the Sony power supplies.

(snip)

Thanks for the photos, Tom. Those SONY switching supply cases look very good. And at $10 a pop they are truly a hobbiest's bargain. But I still have several issues with switchers.

The first is inrush current when switched on. I guess if you leave them on forever there is no problem. Second is power factor. Very few switchers have power factor correction. Thus they draw a lot of "virtual" current. More important is the power line distortion caused by the pulse like nature of the load they represent to the power line impedance. This means noise. Add the switcher's own RF harmonics and you have the potential to ruin radio reception in and around the shack.

While typing this an FRL-L arrived from Lehman Scientific. It came with a copy of an FRK installation and operation manual circa 1974. The minimum supply voltage is 23 VDC. Thus a 24 volt supply is close to the lower margin. The cold current draw is 1.7 amperes. As for power supply ripple, I quote from the manual. "In order to realize the best signal to noise ratio performance of 120 dB, the maximum ac ripple on the output of the power supply must be less than one millivolt peak to peak particularly at 120 Hz."

If spectral purity is important to you, a switcher may not suffice!

Assuming the supplied schematic diagrams are reasonably similar to the FRK-L, then adding external electrical frequency trim should be easy. The print for board #3, 20V supply & resonator thermostat, shows a resistor R-10 which is simply moved from its connection to the internal 1k trimmer to a position that feeds pin #8 of the external connector header to enable the optional external control. An external motorized 1k trimmer or a mosfet device could be used to control the current through magnetic field coil of the Rb cell.

I also found this note interesting in the section on maintenance. "In the unlikely case that it is necessary to replace the rubidium spectral lamp, the exchange can be made without turning the unit off."

Sincerely,

Ira A. Wilner (W1IRA)

141. FRK-L RB oscillators from Lehman Scientific

From: "Ira A. Wilner" <bdcst@vermontel.com>
Date: Thu, 16 Apr 1998 20:43:39 -0500
To: "Tom Clark (W3IWI)" <tac@clark.net>, tacgps@tapr.org
Message-ID: <199804170038.UAA21104@eureka.vermontel.com>
Rendered body type: text/plain

I forgot to mention the source of the current batch of FRK-L Rb oscillators. Mine has a sticker from a company called Global Systems Inc. Their label calls it a GNS-500A Frequency Standard for a VLF/Omega Navigation System!

Aside from a modest heatsink attached to the main chassis dissipation plate, there are four rubber shock mounted studs on the bottom of the case. By comparison, Tom's photo of his M-100 looks

over heatsunk. :-)

--Ira

142. My Efratom Rb unit...

From: John Ackermann N8UR <jra@febo.com>
Date: Thu, 16 Apr 1998 21:10:34 -0400
To: tacgps@tapr.org
Message-ID: <199804170110.VAA27976@meow.febo.com>
Rendered body type: text/plain

The Efratom Rb that I picked up for $300 at Hamvention about four years ago (and have yet to put into regular service :-( ) is a model FRS-C, although the unit doesn't have that part number anywhere on it -- it carries an Efratom part number of 100323-001 and a customer part number of WP-92066 L1. The date of manufacture is week 25 of 1991.

I don't know if this unit bears any resemblance to the units that are coming on the market now, but here are some details from the manual that might be of some interest.

The unit is 2x3x4 inches, with a DB-15 connector that incorporates a coax connector for the 10MHz output.

Here's an important bit of information: the unit's baseplate must be kept at 65 degrees C or lower; this requires mounting to a heatsink, or at least a decent sized metal surface.

On power supply ripple:
"In order to obtain the cleanest output signal close to the carrier, the maximum ac ripple on the supply voltage must be less than 1mv peak-to-peak. If non-harmonics at the supply ripple frequency are not a consideration, the ripple can be higher, but in no case should the supply voltage AC +/- peak exceed the upper or lower power limit of the unit."

With respect to external frequency control:
"The external frequency adjustment feature allows the user to change the output frequency of the FRS over a range of +/- 1 to +/- 1.5 x 10E-9 using a customer supplied 1000 ohm potentiometer, or placing 0 to +5 volts across the external connector pins."

If anyone's interested, here are the specs from the book:

Input voltage: 22-30 volts, 2.0 A peak at turn on; steady state draw is 12 watts @ 24VDC.

The input voltage sensitivity is 5E-11 for +/- 10% VDC

Long term drift is <= 5E-11/Month, +/- 5E-10/Year
1-day stability is 1E-10/day, improving to 4E-11/day after seven days of continuous operation

The short term stability is:

1.0 Second (Allen Variance): 1E-10
10 Second (Allen Variance): 3.16E-11
100 Second (Allen Variance): 1E-11

The phase noise (SSB 1Hz BW) is -70dB/sqrt(Hz) at 1 Hz, improving to -130dBc at 1 KHz

The frequency trim range is +/- 1E-9 minimum with a setting resolution of 1E-11.

The frequency change over -5 degrees C to +55 degrees C is less than 3E-10.

There's also a slightly higher performance model (the FRS-N) that seems to differ only in having about a 3dB better short term stability (e.g., 5E-11 for 1 second).

John N8UR
jra@febo.com
http://www.febo.com

143. week 1024 rollover

From: chrise@n0jcf.com (Chris Elmquist)
Date: Thu, 16 Apr 1998 20:53:58 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <m0yQ0Lm-000UOIC@n0jcf.com>
Rendered body type: text/plain

Are there any issues with the week 1024 rollover having an adverse affect
on say, GPS-20 modules?

Does anyone know how they will behave?

Perhaps this has been discussed at length and then I apologize for bringing it
up again but would appreciate pointers to the history of it then...

Chris
--
Chris Elmquist, N0JCF
chrise@n0jcf.com

144. Re: [TACGPS:1368] W3IWI M100 Rubidium setup

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Fri, 17 Apr 1998 04:56:04 +0100
To: tacgps@tapr.org
Message-ID: <3536E0E4.11CDE324@clark.net>
Rendered body type: text/plain

Ira A. Wilner wrote:
> [snip]
> Thanks for the photos, Tom. Those SONY switching supply cases look
> very good. And at $10 a pop they are truly a hobbiest's bargain.
> But I still have several issues with switchers.
>
> The first is inrush current when switched on. I guess if you leave
> them on forever there is no problem. Second is power factor. Very
> few switchers have power factor correction. Thus they draw a lot of
> "virtual" current. More important is the power line distortion
> caused by the pulse like nature of the load they represent to the
> power line impedance. This means noise. Add the switcher's own RF
> harmonics and you have the potential to ruin radio reception in and
> around the shack.

The local "noise" depends a lot on how well they are shielded. My
initial tests show they are pretty quite.

> While typing this an FRL-L arrived from Lehman Scientific. It came
> with a copy of an FRK installation and operation manual circa 1974.
> The minimum supply voltage is 23 VDC. Thus a 24 volt supply is close
> to the lower margin. The cold current draw is 1.7 amperes. As for
> power supply ripple, I quote from the manual. "In order to realize
> the best signal to noise ratio performance of 120 dB, the maximum ac
> ripple on the output of the power supply must be less than one
> millivolt peak to peak particularly at 120 Hz."
>
> If spectral purity is important to you, a switcher may not suffice!

First, on the voltages from the Sony units -- there is a pot inside
to set each unit's +5 & +12 voltages. I set mine at 13v each, so
my Sony stack is producing 26 volts. According to my much more
detailed book, the minimum supply voltage spec is 22.5v, so I have
3.5v of headroom.

Well, if you look at the schematics, you will see that the innards
have a lot of analog, lossy regulation. The short-term stability is
determined totally by the properties of the xtal oscillator and
the distribution amplifier. The oscillator & buffer are powered
by an internally regulated +20v source, and there are a huge batch
of 180 uH + 6800 pf isolation filters. That, plus the fact that
I'm only showing < 1 mV RMS of AC hash on the +24v output (measured
on a good Fluke 8060 True RMS multimeter), tells me that conducted
noise has is totally a red herring. You may have religious and/or
philosophical objections to switchers, and you may have some radiated
RFI problems, but conducted RFI is not a problem.

My book sez, on this topic, "In order to obtain the cleanest output
signal close to the carrier, the MAXIMUM AC ripplye on the supply
voltage must be < 100 mV peak-to-peak (i.e. < 30 mV RMS)."

Since the issue of power supply regulation keeps coming up, the
Efratom spec book sez that the frequency stability is 1:10e11 for
a TEN PERCENT change in supply voltage.

> Assuming the supplied schematic diagrams are reasonably similar to
> the FRK-L, then adding external electrical frequency trim should be
> easy. The print for board #3, 20V supply & resonator thermostat,
> shows a resistor R-10 which is simply moved from its connection to
> the internal 1k trimmer to a position that feeds pin #8 of the
> external connector header to enable the optional external control.
> An external motorized 1k trimmer or a mosfet device could be used to
> control the current through magnetic field coil of the Rb cell.

It's much simpler than that. The C-field coil (resistance < 1 ohm)
has one side grounded, the other side goes to R42 = 274 ohm resistor
which inside the Rb is ~1.8 volts potential. From there the signal
is driven from various jumper selected resistors R36-R41 and
2kohm pot R35 from the + 20v supply. My TOTALLY ELECTRONIC, ZERO
FANCY PARTS mod (which is what Efratom does in the versions that
allow for an external C-field control) breaks this resistor chain
at the R42=1.8v point. Then these points are re-jumpered, the
Rb is unmodified. When the jumper is broken, the C-field can be
driven from a ~0-5V DC control voltage thru a ~500 ohm resistor.
The thought of using a motorized pot is, IMHO, morally repugnant!

> I also found this note interesting in the section on maintenance.
> "In the unlikely case that it is necessary to replace the rubidium
> spectral lamp, the exchange can be made without turning the unit
> off."

Providing you can find a replacement!

Now to the other comments of the day:

Tom Van Baak asked:
> Have you hacked one of your M-100's yet to expose
> an EFC input? From the schemetic it looks straight
> forward, but I noticed neither end of the 20-turn
> fine adjustment pot is actually at ground.
>
> If you've done this already, have you measured the
> V/Hz sensitivity, and linearity of the EFC input?

Yes, the hack described above has been done. The
C-field tuning range, as I recall, is ~1:10e9.

John Ackermann reported on his Dayton find and said

> Here's an important bit of information: the unit's baseplate must be
> kept at 65 degrees C or lower; this requires mounting to a heatsink, or
> at least a decent sized metal surface.

Yep, that's what I said in my comments, and that's why I have quite
a bit of metal in my heatsink, as seen in the photos.

> On power supply ripple:
> "In order to obtain the cleanest output signal close to the carrier,
> the maximum ac ripple on the supply voltage must be less than 1mv
> peak-to-peak. If non-harmonics at the supply ripple frequency are not
> a consideration, the ripple can be higher, but in no case should the
> supply voltage AC +/- peak exceed the upper or lower power limit of the
> unit."

Same words as in my manual, except my book (as indicated above) has
a 100 mV value.

> With respect to external frequency control:
> "The external frequency adjustment feature allows the user to change
> the output frequency of the FRS over a range of +/- 1 to +/- 1.5 x
> 10E-9 using a customer supplied 1000 ohm potentiometer, or placing 0 to
> +5 volts across the external connector pins."

John -- since your unit is different, and since it has the C-field
mod already installed, maybe you can report on precisely what circuit
they use. And thanks for confirming my ~1:10e9 recollection.

And answering Bob Smith, Tom Van Baak said
> "Robert L. Smith" <bobsmith@i2020.net> wrote:
> >
> > How good are these units without TACTOC stabilization.
> > Looking for a pretty good freq standard for my lab, but
> > don't want to get into the gps businisess at this time.

> > After Lehman calibrates them what is their initial accuracy
> > and expected drift rate? I am looking for overall accuracy
> > in the 1e-7 to 1e-8 range. How long would one of these stay
> > in that range after purchase??
> >
> > TIA es 73, de bob, wa4ypv
>
> Initial accuracy is within 1e-11 for sure. Drift rate is
> a few parts in 10^11 per month depdending on the unit.
> Ignoreing other effects, it will remain frequency accurate
> to 1e-7 or 1e-8 for roughly a thousand months (~80 years).
> Nice, eh?
>
> In fact, I would guess that many people would be happy
> spending $500 for such a Rb standard and avoid TAC, TOC,
> GPS, and further discussions on which OCXO to buy entirely.

I was going to make some similar comments. These Rubidiums are good
frequency standards. If you only need 1:10e8 (i.e. 1 Hz @ 100 MHz),
then they can deliver this performance virtually forever. If you
want to push towards 1:10e9 then you need some way to verify the
frequency over the long haul.

The way I recommend that you do this is to add a divider to count the
10 MHz frequency to be a 1PPS time signal. Since one day is about
100,000 seconds (actually 86400), if the timing signal drifts by one
microsecond in one day, then the frequency accuracy is calibrated to
1:10e11. The "magic" that GPS has given us in the the past few years
is that we now can have a clock with sub-microsecond accuracy easily --
which is why I've spent the last 4 years of my life trying to develop
way to get Good! Cheap! Accurate! time.

The TOC idea was to get the ~10e-9 to 10e-10 performance levels with
cheap crystals. But these rubes provide an interesting alternative
that some may find attractive. If you have a rube and a time-interval
counter, then you close the servo loop manually every few months
by tweaking the C-field pot. But the GPS receiver is needed so that
you have an external source of good time.

As part of the "Analog TOC" design I've been doing, I have the needed
counter chain and with a few added parts (total of < 10 chips) you
can eliminate the need for the counter, using a good analog DVM to
measure the width of the pulse between the two 1PPS clocks. Maybe I
should "spin off" this part of the TOC to meet just these needs!
Comments?

[I hope that the volume of these requests goes down a bit soon! I'm
spending more time answering Email than I am developing the widgets!]

73, Tom

145. Re: [TACGPS:1376] week 1024 rollover

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Fri, 17 Apr 1998 05:06:59 +0100
To: tacgps@tapr.org
Message-ID: <3536E373.D1951950@clark.net>
Rendered body type: text/plain

Chris Elmquist wrote:
>
> Are there any issues with the week 1024 rollover having an adverse affect
> on say, GPS-20 modules?
>
> Does anyone know how they will behave?
>
> Perhaps this has been discussed at length and then I apologize for bringing it
> up again but would appreciate pointers to the history of it then...

Chris -- both Garmin and Motorola say they have the problem under control.
I've done some testing on the ONCOREs and they look OK to me. At the worst,
you may have to power the unit down. And if that fails, force the rcvr to
do a full cold-start.

For those who don't know about the problem, the GPS broadcast message has
the time encoded as a 20-bit number for the 0-604799 seconds in a week,
and the weeks are reconed from the dawn of the GPS era, Jan.6 1980.
The week number is only carried as 10 bits, so it rolls over from 1023
to zero every ~19+ years. The magic time for the rollover is Saturday
nite, Aug.21,1999 at GPS midnite (a few seconds before the UTC midnite.

The "few" will be ~13 depending on leap-seconds that may be added). The
point at issue is how the various rcvr manufacturers have the conversion
from GPS week to human dates coded in their firmware, and whether their
orbit models properly handle the case when new date+time << old date+time.
The manufacturers say Trust Me! (but the last person who said that to me
was my proctologist, just before he said "Bend Over. I'm Driving.").

73, Tom

146. Re: [TACGPS:1377] Re: W3IWI M100 Rubidium setup

From: "Ira A. Wilner" <bdcst@vermontel.com>
Date: Fri, 17 Apr 1998 10:01:44 -0500
To: "Tom Clark (W3IWI)" <tac@clark.net>, tacgps@tapr.org
Message-ID: <199804171356.JAA12793@eureka.vermontel.com>
Rendered body type: text/plain

> Date: Fri, 17 Apr 1998 00:04:33 -0500 (CDT)
> Reply-to: tacgps@tapr.org
> From: "Tom Clark (W3IWI)" <tac@clark.net>
> To: tacgps@tapr.org
> Subject: [TACGPS:1377] Re: W3IWI M100 Rubidium setup

> It's much simpler than that. The C-field coil (resistance < 1 ohm)
> has one side grounded, the other side goes to R42 = 274 ohm resistor
> which inside the Rb is ~1.8 volts potential. From there the signal
> is driven from various jumper selected resistors R36-R41 and
> 2kohm pot R35 from the + 20v supply.

Tom,

We may be dealing with apples and oranges here. The significantly
older FRK's that Lehman is shipping come with schematics that are
quite different than your M-100. But the concept is similar. The
C-coil is grounded on one side. R12 at 270 ohms and R19 make up a
voltage divider across the hot side of the c-coil. A 1k trimmer in
series with R10 but in parallel with R11 makes up the internal
control network wired to the regulated 20 v bus. Moving R10 to
another position activates the external control between pins 9 and 8.
Pin-8 becomes 20 v through R10 while pin-9 is always connected to
the high side of the c-coil. So in essence you are just moving
control to an external 1k pot between pins 8&9. The pot's wiper is
connected to one end of the pot making it simply a variable 1k
resistor.

I'm just wondering if its worth the extra $200 to get the newer
used M-100 instead?

Back to work,

--Ira

147. Re: [TACGPS:1377] Re: W3IWI M100 Rubidium setup

From: "Ira A. Wilner" <bdcst@vermontel.com>
Date: Fri, 17 Apr 1998 10:07:49 -0500
To: "Tom Clark (W3IWI)" <tac@clark.net>, tacgps@tapr.org
Message-ID: <199804171402.KAA14302@eureka.vermontel.com>
Rendered body type: text/plain

Oops, I forgot to add that, based upon the prints I have for the FRK,
with pin-9 always going to the hot side of the c-coil, it would
seem that all one has to do is turn the internal trimmer to max
resistance, then hook up an external variable voltage source
between pin-9 and ground to power the c-coil externally without
opening the case to make mods.

--Ira

148. Re: [TACGPS:1377] Re: W3IWI M100 Rubidium setup

From: "Ira A. Wilner" <bdcst@vermontel.com>
Date: Fri, 17 Apr 1998 10:18:00 -0500
To: "Tom Clark (W3IWI)" <tac@clark.net>, tacgps@tapr.org
Message-ID: <199804171412.KAA15934@eureka.vermontel.com>
Rendered body type: text/plain

> Date: Fri, 17 Apr 1998 00:04:33 -0500 (CDT)
> Reply-to: tacgps@tapr.org
> From: "Tom Clark (W3IWI)" <tac@clark.net>
> To: tacgps@tapr.org

> Subject: [TACGPS:1377] Re: W3IWI M100 Rubidium setup

> I'm only showing < 1 mV RMS of AC hash on the +24v output (measured
> on a good Fluke 8060 True RMS multimeter), tells me that conducted
> noise has is totally a red herring. You may have religious and/or
> philosophical objections to switchers, and you may have some radiated
> RFI problems, but conducted RFI is not a problem.

Excellent! My Fluke 8060 died last year from unknown causes. I
prefer to use a decent scope and look at the actual ripple. Unlike a
DVM you get a better feel for the noise and its shape/harmonics
content, especially if its high frequency junk from the switcher.
Even the 8060 may not have the bandwidth to measure it properly.

--Ira

149. Re: [TACGPS:1377] Re: W3IWI M100 Rubidium setup

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Fri, 17 Apr 1998 14:48:21 +0100
To: bdcst@vermontel.com
Cc: tacgps@tapr.org
Message-ID: <35376BB5.4AAD562C@clark.net>
Rendered body type: text/plain

Ira A. Wilner wrote:
> [snip]
> I prefer to use a decent scope and look at the actual ripple. Unlike a
> DVM you get a better feel for the noise and its shape/harmonics
> content, especially if its high frequency junk from the switcher.
> Even the 8060 may not have the bandwidth to measure it properly.

Yes, But -- the power supplies internal to these standards are a
lo-pass filter. And the internal power distribution has heavy
filtering (in the M100, each internal circuit has a 180 uH + 6800
pF LPF feeding it. This is resonant at ~4600 Hz, so zilch above
a few kHz gets past it). The Rb internally demands this filtering
so its various sections don't kill each other. So the 8060's ~20
kHz RMS measurement bandwidth is fine.

My experience with really clean frequency standards (Hydrogen
Masers) multiplied up to X-band for use as intercontinental
microwave rcvr local oscillators that are coherent for measurement
times ~1000 sec (in Very Long Baseline Interferometry -- you can
glean a bit about our program at http://lupus.gsfc.nasa.gov) is
that power supply noise from 50/60 Hz power mains is often a show-
stopper. In some cases we have gone to switchers for the Masers
because they make CXLEANER signals because they LACK the 50/60 Hz
crap characteristic of linear supplies (and bad ground loops).

So I am still not convinced that switching supply hash is seen by
the rube. Like I said, you may dislike switchers because of
radiated RFI or on religious grounds, but IMHO they are a GOOD
(and thanks to the availability of these Sony bricks, cheap) choice
for these Rubidium standards we are discussing.

73, Tom

150. Re: [TACGPS:1378] Re: week 1024 rollover

From: chrise@n0jcf.com (Chris Elmquist)
Date: Fri, 17 Apr 1998 09:52:13 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <m0yQCUv-000UOIC@n0jcf.com>
Rendered body type: text/plain

Tom Clark wrote:
> The manufacturers say Trust Me! (but the last person who said that to me
> was my proctologist, just before he said "Bend Over. I'm Driving.").

Thanks for the reply Tom. Let's hope Garmin, Motorola and your
proctologist haven't been working together recently...

I sent an email to Garmin's OEM group asking the same question several
days ago... but have not yet heard anything back.

If they do have some serious firmware issues, we could be in trouble
since I'm not aware of many units that have flashable firmware...
are you? We'd be desoldering SMT roms till the cows come home.

73, cje

--
Chris Elmquist, N0JCF
chrise@n0jcf.com

151. Late for work

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Fri, 17 Apr 1998 12:21:45 -0400
To: "TAC-2 mail list" <tacgps@tapr.org>
Message-ID: <000001bd6a1c$ea37dcc0$481f5c18@john.tampabay.rr.com>
Rendered body type: text/plain

OK - so we have our new Rb standard up and running and locked to GPS with the TOC. Our T.I. meter shows that the interval between GPS 1PPS and our standard 1 PPS remains constant so everything looks great except that we notice that our standard 1PPS pulse is about 450 microseconds behind the GPS pulse and this means our local RTC is 450 µs late and I don't want to have to use that as an excuse for being late for work or, more importantly, late for dinner. My question is: Does anyone have any info on a variable phase-shifter that could be inserted into the Rb output or, better yet, a digital delay generator that could be used to delay the standard 1PPS so that it lines up exactly with the GPS 1 PPS? Decade steps of say, 10 µs to 1,000,000 µs (1period) would be useful. I understand there are commercial units that will do this but homebrew would be preferred to save $. Has anyone ever constructed such a device?

Thanks.

73, John W4SF

152. Re: [TACGPS:1384] Late for work

From: clark@tomcat.gsfc.nasa.gov (Tom Clark -- W3IWI)
Date: Fri, 17 Apr 98 17:09:03 UTC
To: tacgps@tapr.org
Message-ID: <58787@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

John -- which GPS rcvr are you using? The ONCOREs have an epoch shifting offset which allows the GPS rcvr pulse to be slewed in 1 nsec steps. The use of this is supported fully in both my SHOWTIME and Rick's TAC32 software.

Tom

153. RE: [TACGPS:1385] Re: Late for work

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Fri, 17 Apr 1998 13:50:04 -0400
To: <tacgps@tapr.org>
Message-ID: <000001bd6a29$406f95e0$481f5c18@john.tampabay.rr.com>
Rendered body type: text/plain

Tom -- I am using a Garmin GPS20 but plan to replace it with an ONCORE soon. If I slew the GPS pulse (instead of the local pulse) to make it agree with the local pulse then wouldn't that mean that both pulses would be in error (referenced to UTC) by the amount of the slew? Am I missing something here?

John

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Tom Clark -- W3IWI
Sent: Friday, April 17, 1998 1:25 PM
To: tacgps@tapr.org
Subject: [TACGPS:1385] Re: Late for work

John -- which GPS rcvr are you using? The ONCOREs have an epoch shifting offset which allows the GPS rcvr pulse to be slewed in 1 nsec steps. The use of this is supported fully in both my SHOWTIME and Rick's TAC32 software.

Tom

154. Re: [TACGPS:1348] Rubidium Oscillators

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Fri, 17 Apr 1998 13:59:27 -0400
To: tacgps@tapr.org

Message-ID: <3537987F.79A8B375@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

For Bill Post,N6HAV:
The copy of the FRK documents arrived this morning -- thanks!

For all:
I've only scanned Bill's material briefly, but here are a few
comments:

(1) The "20-pin terminal strip" is actually a connector. Remove the
    two 2-56 screws and it will pop off. It appears that the ONLY
    difference from my M-100 is that the 10 MHz output is on pin T
    & its gnd on pin W in the FRK, while it is on an SMA connector
    in the M-100.

(2) It is clear that the M-100s (vintage late 1980's and early 90's)
    are an evolutionary change from the older Lehmann FRKs (vintage
    1970's). They completely re-did the electronics innards using
    different parts but an identical philosophy. Sorta like a 1975
    Ford being the same but different from a 1990 Ford. In particular,
    when I was talking about the C-field pot being on board A5 in the
    M-100, it is on board #3 in the older FRKs. The C-field drive
    circuitry is nearly (but not quite) the same. Ira's description
    of the Board #3 circuitry with 270 ohm resistor) is correct, and
    nearly the same as my description of the board A5 circuitry (with
    a 274 ohm resistor). I will suggest that we pick a pair of unused
    pins on the (nearly) identical 20-pin connector to be jumpered
    to use the internal C-field pot, and to serve as the external
    C-field input when the jumper on the connector is cut. OK?

(3) The heat sink Lehmann is providing looks nice. If you choose to
    mount the FRKs on a metal plate, you undo the eight 4-40 screws
    thru the heat sink and mount your unit sorta like I did with the
    M-100 (as seen in the photos I posted yesterday).

Again thanks, Bill. And thanks for sending the photos. If/when anyone
opens up an FRK, take some pictures of the innards. I'll do the same
with the M-100 just so we documment the similarities & differences.
Maybe John Ackerman can document the innards of the rather different
FRS unit (I wish that I had found one for $300 !! -- maybe Dayton this
year.)

73, Tom

155. TAC/TOC at Dayton?

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Fri, 17 Apr 1998 14:02:51 -0400
To: TACGPS Maiing List <tacgps@tapr.org>
Message-ID: <3537994B.722BE23D@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

How many of the folks interested in high accuracy time/frequency
applications will be at Dayton? If many of y'all will be there,
it might be worth agreeing on a time/place to meet. It might be
worthwhile to agree to chat at the TAPR Digital Dinner Saturday
nite.

73, Tom

156. Re: [TACGPS:1388] TAC/TOC at Dayton?

From: John Ackermann N8UR <jra@febo.com>
Date: Fri, 17 Apr 1998 15:08:21 -0400
To: tacgps@tapr.org
Message-ID: <199804171908.PAA04565@meow.febo.com>
Rendered body type: text/plain

In message <3537994B.722BE23D@tomcat.gsfc.nasa.gov>, "Dr Thomas A Clark (W3IWI)
" writes:
>How many of the folks interested in high accuracy time/frequency
>applications will be at Dayton? If many of y'all will be there,
>it might be worth agreeing on a time/place to meet. It might be
>worthwhile to agree to chat at the TAPR Digital Dinner Saturday
>nite.
>
>73, Tom

Tom mistyped an important bit -- the dinner is Friday evening not
Saturday. And we'd love to see all the frequency freaks there!

There's info on the dinner available at www.tapr.org, but the short
pitch is: 7:00 PM Friday evening at the NCR Sugarcamp facility just
south of downtown. Cost is $20 per person. Reservations can be made
in advance through TAPR, or at the TAPR booth up until 4:00PM on Friday.
NO TICKETS AT THE DOOR!!! Dinner speaker will be Doug McKinney, KC3RL,
who will talk about tracking El Nino via GPS and buoys.

73,
John N8UR
jra@febo.com

157. Re: [TACGPS:1382] Re: W3IWI M100 Rubidium setup

From: "Ira A. Wilner" <bdcst@vermontel.com>
Date: Fri, 17 Apr 1998 16:54:18 -0500
To: "Tom Clark (W3IWI)" <tac@clark.net>, tacgps@tapr.org
Message-ID: <199804172049.QAA10386@eureka.vermontel.com>
Rendered body type: text/plain

> Date: Fri, 17 Apr 1998 09:53:51 -0500 (CDT)
> Reply-to: tacgps@tapr.org
> From: "Tom Clark (W3IWI)" <tac@clark.net>
> To: tacgps@tapr.org
> Subject: [TACGPS:1382] Re: W3IWI M100 Rubidium setup

> So I am still not convinced that switching supply hash is seen by
> the rube. Like I said, you may dislike switchers because of
> radiated RFI or on religious grounds, but IMHO they are a GOOD
> (and thanks to the availability of these Sony bricks, cheap) choice
> for these Rubidium standards we are discussing.

Actually I dislike switchers on principle and by experience. I've
seen too many cheap jobbies which are full of hash including 120Hz
artifacts! And they play havoc with power lines causing a lot of
dirty power problems. Ask any power utility engineer and they'll
tell you that non-linear switcher loads are becoming a really big
issue. Europeans actually have stringent standards in place to
insure that switchers are designed with better filtration and PF
correction.

Switchers are certainly more efficient than linears. But as a result
they store little energy. So power blinks become issues unless you
add batteries.

Be that as it may, I'm surrounded by switchers in my VCR's, VDT's,
computers and my spectrum analyzer.

And those SONY's of yours appear to be quite good. So I surrender!!!

:-)

73,
Ira

--Ira A. Wilner

               WILNER ASSOCIATES
         Email: bdcst@vermontel.com
  Web Site: http://www.vermontel.com/~bdcst

158. Re: [TACGPS:1384] Late for work/ phase lock is no pun

From: "Ira A. Wilner" <bdcst@vermontel.com>
Date: Fri, 17 Apr 1998 16:54:18 -0500
To: "John K. Pringle" <jpringle@tampabay.rr.com>, tacgps@tapr.org
Message-ID: <199804172049.QAA10393@eureka.vermontel.com>
Rendered body type: text/plain

> Date: Fri, 17 Apr 1998 11:26:04 -0500 (CDT)
> Reply-to: tacgps@tapr.org
> From: "John K. Pringle" <jpringle@tampabay.rr.com>
> To: tacgps@tapr.org
> Subject: [TACGPS:1384] Late for work

> OK - so we have our new Rb standard up and running and locked to GPS with
> the TOC. Our T.I. meter shows that the interval between GPS 1PPS and our
> standard 1 PPS remains constant so everything looks great except that we
> notice that our standard 1PPS pulse is about 450 microseconds behind the GPS
> pulse and this means our local RTC is 450 µs late and I don't want to have
> to use that as an excuse for being late for work or, more importantly, late

> for dinner. My question is: Does anyone have any info on a variable
> phase-shifter that could be inserted into the Rb output or, better yet, a
> digital delay generator that could be used to delay the standard 1PPS so
> that it lines up exactly with the GPS 1 PPS? Decade steps of say, 10 µs to
> 1,000,000 µs (1period) would be useful. I understand there are commercial
> units that will do this but homebrew would be preferred to save $. Has
> anyone ever constructed such a device?

Gee John, you could give the T.I. meter/intelligent Rb controller
more leeway and let it establish phase lock. Of course it might
take a long interval to bring it into sync, but then it would remain
that way. When you regain GPS lock after an outage duration, it
might force the Rb to go quite far off frequency for brief periods
to chase lock. So don't do critical timing during those moments.

:-(

And of course, if you allow the controller to run the Rb that
tightly, you might be subject, in the long term, to reduced short
term accuracy, if you get my drift! Better to let the phase lock
corrections happen over a long interval. Sorta like watching paint
dry.

--Ira

159. WRC-99 & GPS

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Fri, 17 Apr 1998 17:19:14 -0400
To: TACGPS Maiing List <tacgps@tapr.org>
Cc: gps-dev@amsat.org, AMSAT BoD <bod@amsat.org>
Message-ID: <3537C752.121832CB@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

There has been a lot of recent activity on the required RFI protection
levels for GPS in advance of WRC-99. Part of the issue involves the
notion that has been proposed by INMARSAT that part of the 1575.42
+/-12 MHz GPS L1 frequency allocation could be shared between GPS
and MSS (Mobile Satellite Service).

NASA and other space users of GPS have been concerned that the
studies that INMARSAT presented in Geneva last October were based
on the simplification that all GPS applications are terrestrial.
In addition, a number of groups (the aircraft navigation folks,
spacecraft people, etc) would like to achieve a higher degree
of protection at the L2 allocation 1227.60 +/- 12 MHz (which abuts
the bottom end of the amateur 23 cm band at 1240 MHz).

In preparation for establishing the US position, the various study
groups have been working hard to get ready for WRC-99. The current
US positions are available for viewing (in MS Word .DOC format) from
the NTIA web site at URL

     http://ntiacsd.ntia.doc.gov/gps/

You will see two questions -- #220 applies to harmful interference
to terrestrial applications at URL
     http://ntiacsd.ntia.doc.gov/gps/res220/
and #219 refers to spacecraft applications at URL
     http://ntiacsd.ntia.doc.gov/gps/que219_8/

I was involved in preparing the #219 material, and you will find that
AMSAT P3D is included in the background paper 8D19 at
http://ntiacsd.ntia.doc.gov/gps/que219_8/USWP8D19.DOC
and that there is a GPS-in-space issues tutorial in 8D7 at URL
     http://ntiacsd.ntia.doc.gov/gps/que219_8/uswp8d7.doc

You will also find that the list of terrestrial applications included
in the #220 material is of interest. In particular see paper 8D15
at URL http://ntiacsd.ntia.doc.gov/gps/res220/Uswp8d15.doc and in
8D16 at URL http://ntiacsd.ntia.doc.gov/gps/res220/Uswp8d16.doc

Lately there has also been a lot of furor (and much misinformation)
on Gore's pronouncement about the 2nd civil frequency being enabled
by 2004. This involves the L2 frequency just below the 23 cm
amateur band; if there is interest in what's happening on this front,
I'll make a separate posting in a few days.

The situation is MUCH LESS dire threat (IMHO) to amateurs than was

recently promulgated by an ARRL Division Director recently who indicated
that GPS would cause RFI that would wipe out the 23 cm band.
In fact, the main problem is really that amateur users have been a
significant RFI source to GPS users (the German 23 cm digipeaters are
often mentioned as a problem for terrestrial users of survey-grade
dual-frequency GPS receivers!). Also, I note that the Al Gore L2
Civilian access issue is separate & distinct from the WRC-99
activities I mentioned above -- the only common thread is that GPS
is involved in both.

Please let me know if there is interest in seeing such material.

73, Tom

160. Re: [TACGPS:1388] TAC/TOC at Dayton?

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Fri, 17 Apr 1998 16:38:14 -0500
To: tacgps@tapr.org
Message-ID: <v04003a0cb15d7b66dc6f@[207.8.125.50]>
Rendered body type: text/plain

TAPR dinner is Friday night Tom.

http://www.tapr.org/tapr/html/dayton.html

The "Packet BASH" co-sponsored by TAPR and the Miami Valley FM Association,
Dayton's packet radio club, will be held on Friday of the Dayton
Hamvention. The event will be held at the NCR "Sugarcamp" Conference Center
and will be catered. The dining room holds about 300 people! So the more
the merrier! Dinner space will be limited, so make your reservation early
for dinner, so that the correct number of dinners can be ordered in
advanced.

An event for the digitally-inclined ham, featuring:
* Buffet dinner,
* Nationally-known speaker Doug McKinney, KC3RL, discussing GPS and his
Bouy projects in the Pacific
* TAPR special interest group meetings,
* Prize Giveaways,
* And lots of fun will cost $20 per person.

See the web page for full details and maps.

Greg

>How many of the folks interested in high accuracy time/frequency
>applications will be at Dayton? If many of y'all will be there,
>it might be worth agreeing on a time/place to meet. It might be
>worthwhile to agree to chat at the TAPR Digital Dinner Saturday
>nite.
>
>73, Tom

Greg Jones, WD5IVD   Austin, Texas
wd5ivd@tapr.org   http://www.tapr.org/~wd5ivd

Boren's Laws:
        (1) When in charge, ponder.
        (2) When in trouble, delegate.
        (3) When in doubt, mumble.

161. Re: [TACGPS:1384] TACGPS digest 206

From: Brooke Clarke <brooke@pacific.net>
Date: Fri, 17 Apr 1998 17:17:42 -0700
To: tacgps@tapr.org
Cc: "John K. Pringle" <jpringle@tampabay.rr.com>
Message-ID: <3537F126.E7F@pacific.net>
Rendered body type: text/plain

Hello John:

data delay devices (201) 773-2299 carries a line of programmable time
delay ICs.
The 3D74XX series is serially programmable and comes with step sizes
ranging from
10 to 500 nS/bit with 7 or 8 bits (as far as I can remember). Not low

cost at qty. 1.

Have Fun,

Brooke
N6GCE
> ------------------------------
>
> Date: Fri, 17 Apr 1998 12:21:45 -0400
> From: "John K. Pringle" <jpringle@tampabay.rr.com>
> To: "TAC-2 mail list" <tacgps@tapr.org>
> Subject: Late for work
> Message-ID: <000001bd6a1c$ea37dcc0$481f5c18@john.tampabay.rr.com>
>
> OK - so we have our new Rb standard up and running and locked to GPS with
> the TOC. Our T.I. meter shows that the interval between GPS 1PPS and our
> standard 1 PPS remains constant so everything looks great except that we
> notice that our standard 1PPS pulse is about 450 microseconds behind the GPS
> pulse and this means our local RTC is 450 µs late and I don't want to have
> to use that as an excuse for being late for work or, more importantly, late
> for dinner. My question is: Does anyone have any info on a variable
> phase-shifter that could be inserted into the Rb output or, better yet, a
> digital delay generator that could be used to delay the standard 1PPS so
> that it lines up exactly with the GPS 1 PPS? Decade steps of say, 10 µs to
> 1,000,000 µs (1period) would be useful. I understand there are commercial
> units that will do this but homebrew would be preferred to save $. Has
> anyone ever constructed such a device?
>
> Thanks.
>
> 73, John W4SF
>

162. Re: [TACGPS:1384] Late for work

From: ChrisEilbeck <chris@yordas.demon.co.uk>
Date: Sat, 18 Apr 1998 00:16:33 +0000
To: tacgps@tapr.org
Message-ID: <3537F0E1.827296DA@yordas.demon.co.uk>
Rendered body type: text/plain

Harris Semiconductors build a digital delay line for video work which
you can clock at upto 30MHz and provides delays between 2 and 1281
clocks. I think the no is HSP9502 but you can find a small amount of
info on their web site. You could probably knock up what you need for
less than $50.

Chris
--
Chris Eilbeck
mailto:chris@yordas.demon.co.uk

163. Re: [TACGPS:1392] WRC-99 & GPS

From: "Ira A. Wilner" <bdcst@vermontel.com>
Date: Fri, 17 Apr 1998 20:29:45 -0500
To: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>, tacgps@tapr.org
Message-ID: <199804180024.UAA26739@eureka.vermontel.com>
Rendered body type: text/plain

> Date: Fri, 17 Apr 1998 16:44:10 -0500 (CDT)
> Reply-to: tacgps@tapr.org
> From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
> To: tacgps@tapr.org
> Subject: [TACGPS:1392] WRC-99 & GPS

> There has been a lot of recent activity on the required RFI protection
> levels for GPS in advance of WRC-99. Part of the issue involves the
> notion that has been proposed by INMARSAT that part of the 1575.42
> +/-12 MHz GPS L1 frequency allocation could be shared between GPS
> and MSS (Mobile Satellite Service).

Hello Tom,

I'm very interested in all frequency allocation issues, not just GPS
or Amateur radio since my bread and butter is earned mostly in the
world of commercial broadcasting. And we all are using RF gadgets
more and more in our daily lives.

Maybe German Hams need to switch over to spread spectrum at 23
cm. :-)

And as for Inmarsat versus GPS, at 12,000 miles distance the GPS carriers are quite weak down by terra firma. Patch antennas cannot be replaced with portable dish antennas. :-)

And obviously, space borne missons might receive even more RFI from Inmarsat. But then, consumer GPS receivers won't generate position fixes above 60,000 feet. So much for taking your Garmin along on one of those shuttle rides to the Japanese proposed orbiting hotel!

A problem with spectrum sharing schemes is not taking into account those weak signal users at the fringe of performance. But industry greed and demand has been a driving force for recent FCC policy decisions. Just look at what happened to FM broadcasting.

--Ira

164. Linear vs switcher

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Fri, 17 Apr 1998 20:52:28 -0400
To: "TAC-2 mail list" <tacgps@tapr.org>
Message-ID: <000001bd6a64$426f34a0$481f5c18@john.tampabay.rr.com>
Rendered body type: text/plain

To further the discussion on linear vs switching power supplies: The switching PS has another lesser-known advantage over the linear besides size, weight, efficiency and others mentioned by Tom in that the switcher is not critical as to input waveform. It can handle the quasi-square waves delivered by inexpensive UPS's as used by most computer power backups. Since the switchers have air-core transformers they can handle the sharp wave fronts from the UPS's. Don't plug any power supply or other device with an iron-core transformer into a cheap UPS. The smoke will soon drive you out of the room. For these devices use one of the more expensive UPS's that deliver a waveform that approximates a sine wave. This is what I use for a power backup on my house standard. The power supply cap's are large enough so that the milli-second drop-out that occurs when the UPS takes over the load during a power failure is not a problem. I once had my high-intensity desk lamp which has a 12v bulb and transformer plugged into the same UPS that my computer uses. The first time the power failed (happens frequently in FL in the summer), the computer kept right on going but the next day I visited K-Mart to purchase a new lamp. Lesson learned.

73, John W4SF

165. Re: Late for work

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Fri, 17 Apr 1998 21:00:35 -0400
To: "TAC-2 mail list" <tacgps@tapr.org>
Message-ID: <000101bd6a65$64e348e0$481f5c18@john.tampabay.rr.com>
Rendered body type: text/plain

Brook and Chris -- Thanks for the leads on digital delay devices. I will follow up on both. Hope I can get some application notes from the manufacturers as I have never built such a device, but looks like fun.

73, John W4SF

166. Good Enough Oscillators

From: Steve Sampson <ssampson@access.usa-site.net>
Date: Fri, 17 Apr 1998 20:42:48 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199804180142.UAA05402@access.usa-site.net>
Rendered body type: text/plain

Not too many years ago the thinking for Spread Spectrum was a stable clock to synchronize to. I suspect the thinking derived from the military use of this technique for crypto level circuits (Have Quick and JTIDS radios). I suspect now, that most of the SS gear is redundant enough in hopping to lock-on without stable clocks.

I remember the military radios all used Rubidium clocks and a crummy user interface to sync the radios. In JTIDS we used a narrow-band radio to talk to the other plane and get the two to the nearest second by voice, and then about 5 minutes later they locked-on to each other. The Have Quick's were a little better, as we used a "mickey" site to receive a data time burst (most AF bases had/have?? a beacon).

That leads me to my question: isn't the real goal something less than a

Rubidium based oscillator? That is, a cheap oscillator synchronized to
the GPS in which any anomoly shows up in both oscillators (SA). The use
of which could lock microwave and SS radios.

I'm not very knowledgable at this level, as I visualize a multiplier of
the 1 Hz signal to some multiple to phase lock with. But that's really
my interest in stable oscillators, that is, as a radio device, rather
than a calibration tool. At my level, WWV zero-beat is basically good
enough for my test equipment, but not good enough for SS or microwave.

Steve

167. Re: [TACGPS:1391] Re: Late for work/ phase lock is no pun

From: Dave Martindale <davem@cs.ubc.ca>
Date: Fri, 17 Apr 1998 19:05:13 -0600
To: tacgps@tapr.org
Message-ID: <l03130300b15da8f38082@[198.162.38.159]>
Rendered body type: text/plain

Correct me if I'm wrong, but it seems like there is a very simple fix to
this problem.

One side of the system has a GPS receiver outputting a 1 Hz timing pulse.
The other side has a crystal or rubidium oscillator outputting 10 MHz
(or some other simple frequency) which is then divided down to 1 Hz.
In the long term, phase locking the oscillator 1 Hz to the GPS 1Hz
means that any long-term drift is corrected out.

But there is a one-time startup problem. When the oscillator and its
divider chain start up, they have a random phase relative to the GPS
1 Hz signal. If we let the PLL steer the oscillator towards phase lock,
it will take a long time to get there because of the small frequency
adjustment range, particularly with the Rb standard. And the frequency
is guaranteed to be wrong until lock is achieved.

The real problem here is that we are going to a lot of work to line up
one particular pulse in the frequency standard output, out of 10
million of them, with the GPS 1 Hz output. But the initial state of
the divide-by-10^7 counter is meaningless - any initial state is as
good as any other for ultimate frequency stability. So why not pick
the *particular* initial state that starts the two frequency sources
in phase lock?

The basic idea is this: when the oscillator and divider come on for the
first time, some power-up logic would wait a little while to ensure that
the oscillator was relatively stable. This wait time would depend on
oscillator type. Then the next 1 Hz pulse from the GPS would be used
to clear the divide-by-10^7 counter to zero. This would happen just
once during this power on sequence. Then the phase detector and the
rest of the PLL would be enabled.

This way, the two 1 Hz signals start out in sync, plus or minus 100 ns
or so. The PLL only has to keep them in sync from there out. If the
oscillator starts out pretty accurate, that accuracy will be available
right from the beginning, without the PLL initially messing with the
frequency in order to get phase lock.

        Dave

168. Re: [TACGPS:1397] Linear vs switcher

From: "Ira A. Wilner" <bdcst@vermontel.com>
Date: Fri, 17 Apr 1998 22:09:09 -0500
To: "John K. Pringle" <jpringle@tampabay.rr.com>, tacgps@tapr.org
Message-ID: <199804180203.WAA13233@eureka.vermontel.com>
Rendered body type: text/plain

> Date: Fri, 17 Apr 1998 19:53:17 -0500 (CDT)
> Reply-to: tacgps@tapr.org
> From: "John K. Pringle" <jpringle@tampabay.rr.com>
> To: tacgps@tapr.org
> Subject: [TACGPS:1397] Linear vs switcher

> To further the discussion on linear vs switching power supplies: The
> switching PS has another lesser-known advantage over the linear besides
> size, weight, efficiency and others mentioned by Tom in that the switcher is
> not critical as to input waveform.

Hello John,

This is precisely my gripe about switchers. They pollute the AC
mains so that only switchers can survive the avalanche of harmonics
and noise. This is not to say that you can't build switchers that
don't look like sharp pulsing loads to the incoming AC power. But
building them with PF correction etc. results in higher cost and
lower efficiency.

73,

-Ira

169. Re: [TACGPS:1399] Good Enough Oscillators

From: Dave Martindale <davem@cs.ubc.ca>
Date: Fri, 17 Apr 1998 19:11:51 -0600
To: tacgps@tapr.org
Message-ID: <l03130301b15dad237c74@[198.162.38.159]>
Rendered body type: text/plain

>That leads me to my question: isn't the real goal something less than a
>Rubidium based oscillator? That is, a cheap oscillator synchronized to
>the GPS in which any anomoly shows up in both oscillators (SA). The use
>of which could lock microwave and SS radios.

Having two oscillators that had the same errors at the same time due to
SA-caused GPS signal variations would work over short paths, provided
that the GPS setups were identical enough to be perturbed the same amount.
But you can't guarantee that in general. Even two identical receivers
in the same location may be using different sets of satellites due to
different past histories (e.g. old/new almanac). The further they are
apart, the less coherent the errors are likely to be. While if you
build a system that ignores SA errors and is just plain accurate, it's
accurate wherever you put it.

The other problem with "identical error" setups is that if they cause
your transmit frequency to vary in one direction, and someone else has
the same mechanism cause theirs to vary in the other direction, you
could end up interfering with each other even though you are nominally
far enough apart in frequency to avoid that. You can talk to the guy
on the other end you want to talk to, but you clobber someone else
unintentionally.

        Dave

170. Re: Late for work

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Fri, 17 Apr 1998 22:53:25 -0400
To: "TAC-2 mail list" <tacgps@tapr.org>
Message-ID: <000001bd6a75$28319d60$481f5c18@john.tampabay.rr.com>
Rendered body type: text/plain

Dave Martindale wrote:

[snip]
>The basic idea is this: when the oscillator and divider come on for the
>first time, some power-up logic would wait a little while to ensure that
>the oscillator was relatively stable. This wait time would depend on
>oscillator type. Then the next 1 Hz pulse from the GPS would be used
>to clear the divide-by-10^7 counter to zero. This would happen just
>once during this power on sequence. Then the phase detector and the
>rest of the PLL would be enabled.

>This way, the two 1 Hz signals start out in sync, plus or minus 100 ns
>or so. The PLL only has to keep them in sync from there out. If the
>oscillator starts out pretty accurate, that accuracy will be available
>right from the beginning, without the PLL initially messing with the
>frequency in order to get phase lock.

Dave -- As far as I can tell your idea is sound. Maybe once the PLL achieves
phase lock the problem will go away and the two pulses will be in time
coincidence. Guess we will have to wait and see if the TOC will accomplish
this (clearing the divide-by-10^7 counter, etc.).

Thanks for your response.

73, John W4SF

171. Re: [TACGPS:1402] Re: Good Enough Oscillators

From: Lyle Johnson <lylej@azstarnet.com>
Date: Fri, 17 Apr 1998 21:04:43 -0700
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980417210443.008fbde0@pop.azstarnet.com>
Rendered body type: text/plain

>The other problem with "identical error" setups is that if they cause
>your transmit frequency to vary in one direction, and someone else has
>the same mechanism cause theirs to vary in the other direction, you
>could end up interfering with each other even though you are nominally
>far enough apart in frequency to avoid that. You can talk to the guy
>on the other end you want to talk to, but you clobber someone else
>unintentionally.

HHHmmm. Keep in mind we're talking about trying to go from 1x10^-7 to
1x10^-10 or so. For me, the idea is to have an accurate, precision
frequency reference for ALL of my needs. Transmitters, receivers,
frequency counters, signal generators, clocks, ...

Lyle

172. Re: [TACGPS:1384] Late for work

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Sat, 18 Apr 1998 05:54:39 +0100
To: tacgps@tapr.org
Message-ID: <3538401F.A28E17D4@clark.net>
Rendered body type: text/plain

OK -- I'll blow another hour with yet another long diatribe reply.
This discussion began when John Pringle wrote:
>
> OK - so we have our new Rb standard up and running and locked to GPS with
> the TOC. Our T.I. meter shows that the interval between GPS 1PPS and our
> standard 1 PPS remains constant so everything looks great except that we
> notice that our standard 1PPS pulse is about 450 microseconds behind the GPS
> pulse and this means our local RTC is 450 µs late and I don't want to have
> to use that as an excuse for being late for work or, more importantly, late
> for dinner. My question is: Does anyone have any info on a variable
> phase-shifter that could be inserted into the Rb output or, better yet, a
> digital delay generator that could be used to delay the standard 1PPS so
> that it lines up exactly with the GPS 1 PPS? Decade steps of say, 10 µs to
> 1,000,000 µs (1period) would be useful. I understand there are commercial
> units that will do this but homebrew would be preferred to save $. Has
> anyone ever constructed such a device?

Assuming that you were asking a metrology question, I pointed out that the
ONCORE can be used as a delay line to slew the GPS pulse to match the Rb.
If you are trying to MEASURE the drift, you want as small a time interval
as possible, since the time interval measurement will have a time-base
error proportional to the size of the interval. Since you can trust the
ONCORE to produce a very precise, known timing offset, you still KNOW
the UTC epoch of the Rb very accurately. In the "late to work" analogy
you used, I doubt that you reset your wrist watch every day -- you know
it is gaining 2 sec/day, you know when you last sync'd it, and you wait
until the offset becomes objectionable.

I would point out that your Rb WILL drift w.r.t. the GPS 1PPS pulse. If
it is set to a frequency accuracy of 1:10e10, then it will slide 11 usec/day.
In fact it is this drift rate you will use to tweak it onto frequency.
After it is on frequency, then you can reset the epoch error.

Those comments were followed by a couple of suggestions of digitally
programmable delay lines. Then there was the discussion that the epoch
of the divider chain was indeterminate since it can start up at an
arbitrary time.

For the TOC activity, I have a couple of different divider chains designed
(one uses 74HC160s, the other uses 74HC390s. The former is a more precise
synchronous divider and it can be preset to produce any arbitrary "delay"
but it uses more parts. The HC390 divider can be reset to zero). Implicit
in the design is the ability of the GPS rcvr pulse to "initialize" the
counter to zero offset, either at power-up time or when you decide that
the error has become unbearable. No delay lines are used -- that's the
COMPLICATED solution to a simple problem!

Throughout the course of the day, the discussion deteriorated some more.
Then Steve Sampson said
> [snip]
> That leads me to my question: isn't the real goal something less than a
> Rubidium based oscillator? That is, a cheap oscillator synchronized to

> the GPS in which any anomoly shows up in both oscillators (SA). The use
> of which could lock microwave and SS radios.

That is PRECISELY what we are trying to do with the TOC development. If
you have followed the discussion over the past couple of months, I have
been reporting on an idea I have for a simplified TOC that will use a
fairly cheap crystal and "lock" it at the 1:10e9 level.

> I'm not very knowledgable at this level, as I visualize a multiplier of
> the 1 Hz signal to some multiple to phase lock with. But that's really
> my interest in stable oscillators, that is, as a radio device, rather
> than a calibration tool. At my level, WWV zero-beat is basically good
> enough for my test equipment, but not good enough for SS or microwave.

But here is where you went WRONG. At short time intervals (like under a
minute), the 1PPS signal from the simple C/A code receivers is a SHITTY
frequency standard. If you multiply the raw 1PPS output up to 100 MHz and
listen on an SSB radio, the frequency will hop around badly -- much
much worse than the similar signal from a $2 computer clock oscillator.
The place where GPS shines is that over longer time scales (tens of minutes
to hours to days) it is as close to a "perfect" clock as any of us
will ever own.

As I have discussed many times here, a crystal oscillator is a much better
frequency standard at short time intervals, but it drifts wildly at longer
time scales. The solution is to marry the good characteristics. Instead
of directly multiplying the GPS signal, it is used to slowly steer the
frequency of the crystal. Last week, there was the thread here concerning
HP application note #1289 entitled "The Science of Timekeeping". I commend
it to your reading to get a better feeling for the problem. In that paper
you will find Appendix A which discusses the statistical description of
these processes. I have prepared a plot of my best estimate of the Allan
Variance (that's what is shown in Figure A1 in HP AN #1289) which is posted
in several formats on my aleph ftp server at URL
   ftp://aleph.gsfc.nasa.gov/GPS/tapr_dcc/
[I have done an updated, cleaner version than the ones I showed at the
TAPR/ARRL Conference -- it is the file allanv.pdf and I suggest you pick
it up instead of the earlier versions].

Also, regarding your "identical setup" comments -- unfortunately the
random drifts/offsets of xtals are largely driven by their temperature.
For fairly cheap xtals, the ~15 minute "handover" between the xtal & GPS
is still in the spectral regime where SA is significant. Measurements
of the power spectrum of SA show that the DoD dither is significant in
the range [a few seconds -- ~30 minutes]. If you can average for longer
times, SA goes away. So the filter you use in making the "marriage"
happen is pretty critical to performance. Since a part of the noise
at shorter times comes from the xtals and they are NOT identical, the
two remote sites will have some (possibly significant) amount of differential
phase noise.

Related to these topics, Dave Martingdale said
> The basic idea is this: when the oscillator and divider come on for the
> first time, some power-up logic would wait a little while to ensure that
> the oscillator was relatively stable. This wait time would depend on
> oscillator type. Then the next 1 Hz pulse from the GPS would be used
> to clear the divide-by-10^7 counter to zero. This would happen just
> once during this power on sequence. Then the phase detector and the
> rest of the PLL would be enabled.

Yep, that's a good description of the power-on behavior of the TOC design.

> This way, the two 1 Hz signals start out in sync, plus or minus 100 ns
> or so. The PLL only has to keep them in sync from there out. If the
> oscillator starts out pretty accurate, that accuracy will be available
> right from the beginning, without the PLL initially messing with the
> frequency in order to get phase lock.

Remember that the PLL MUST be really "loose" -- like with integration
times of tens of minutes or more (depending on the quality of the oscillator
you are locking). Also, the loop needs to be a bit more sophisticated.
The timing offset that develops arises because the rate is wrong -- i.e.
the integral of freq*dt, but the control voltage you develop in the PLL
only controls the rate. So you not only need to measure the offset, but
also its rate-of-change. The TOC design I've been developing has both
an offset integrator and a rate "tachometer".

73, Tom

173. Re: [TACGPS:1399] Good Enough Oscillators

From: "Charles E. Heisler K3VDB" <cheisler@cyberia.com>
Date: Sat, 18 Apr 1998 10:18:20 -0400
To: tacgps@tapr.org
Message-ID: <199804181527.5876700@cyberia.com>
Rendered body type: text/html

I'm with you Steve.

Charlie K3VDB

At 08:48 PM 4/17/98 -0500, you wrote:

>Not too many years ago the thinking for Spread Spectrum was a
stable

>clock to synchronize to. I suspect the thinking derived from the
military

>use of this technique for crypto level circuits (Have Quick and
JTIDS

>radios). I suspect now, that most of the SS gear is redundant enough
in

>hopping to lock-on without stable clocks.

>

>I remember the military radios all used Rubidium clocks and a crummy
user

>interface to sync the radios. In JTIDS we used a narrow-band radio
to talk

>to the other plane and get the two to the nearest second by voice,
and then

>about 5 minutes later they locked-on to each other. The Have Quick's
were

>a little better, as we used a "mickey" site to receive a
data time burst

>(most AF bases had/have?? a beacon).

>

>That leads me to my question: isn't the real goal something less than
a

>Rubidium based oscillator? That is, a cheap oscillator synchronized
to

>the GPS in which any anomoly shows up in both oscillators (SA). The
use

>of which could lock microwave and SS radios.

>

>I'm not very knowledgable at this level, as I visualize a multiplier
of

>the 1 Hz signal to some multiple to phase lock with. But that's
really

>my interest in stable oscillators, that is, as a radio device,
rather

>than a calibration tool. At my level, WWV zero-beat is basically
good

>enough for my test equipment, but not good enough for SS or
microwave.

>

>Steve

>

174. Files on Aleph Restructured

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Mon, 20 Apr 1998 15:28:59 -0400
To: TACGPS Maiing List <tacgps@tapr.org>
Message-ID: <353BA1FB.91267B74@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

I just did some minor restructuring of the files on my aleph FTP
file server. There is now a new directory to serve as a repository
for TOC & Rubidium & etc. related material named

    ftp://aleph.gsfc.nasa.gov/GPS/toc/

In this directory you will find the PDF file versions of the two
great 88-page "bible" HP Application Note #1289 = "The Science of
Timekeeping" and the HP Application note #1272 named "GPS and
Precision Timing Applications". These are simply a mirror of the
material from the HP web site.

You will also find my latest, cleanest version of my assessment of
the Allen Variances of a number of time/frequency standards in the
file allanv.pdf and the original TOC block diagram I showed at the
TAPR/ARRL DCC last year. I was also asked to make available the
Parallax Basic Stamp manual (mirrored from the Parallax web site).

Also in a new sub-directory ..toc/rubidium/ are the six GIF photos
of my Efratom M-100 + Sony power supply setup that I mentioned last
week at URL

    ftp://aleph.gsfc.nasa.gov/GPS/toc/rubidium/

I also refreshed my local "mirror" of the latest version of Rick's
TAC32 executables (but not the "Install from the Web" options)from
his cnssys.com site, which can be found at URL

    ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/tac32/

73, Tom

175. A Counter for your Rb/xtal

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Tue, 21 Apr 1998 06:44:12 +0100
To: TACGPS <tacgps@tapr.org>
Message-ID: <353C403C.F31EBC1B@clark.net>
Rendered body type: text/plain

The recent discussions prompted me to clean up one of the designs
I have been working to give you some ideas on how to use/measure
xtal oscillators and rubes. If interested, please fetch the PDF
drawing I have put on aleph at URL

   ftp://aleph.gsfc.nasa.gov/GPS/toc/rubidium/counters.pdf

I haven't built this yet, but it is sufficiently straightforward that
it shouldn't give any problems. I hope to get it cranked out this
week. Here is a brief description of what you'll see in the counters.pdf
schematic:

(1) The sine-wave signal is converted into a 0/5v square wave by the
input buffer U6A. Note that the U6A input is biased to a mid-scale
2.5vDC, so the sine wave input swings the input far enuff to make
digital bits, with ~50% duty cycle. U6 is a 74HC14 hex Schmidt trigger
to insure that it has no zero-crossing "bounce".

(2) The signal then passes thru a 7-stage BCD ripple counter made of
four 74HC390 chips (an alternate design I've done uses faster,
synchronous 74AC160s, but the complexity & parts count is more).

(3) The GPS 1PPS signal comes into U5D. Either a + or - going edge
is selected by jumper and the U5D output is a - going pulse. U7C&D are
an R/S latch that is set by either CT1 being low (power-on reset)
or by pushing S1 momentarily. When the R/S latch is set, the 7-stages
of counter are forced to the reset=high, counter=000000 state. The R/S
latch is cleared by the next GPS input pulse. When in the Running
state, the green section of the dual-color LED is lit (and is off
when awaiting a GPS sync pulse).

(4) U4B is used as a 0.2 second wide pulse generator (instead of
being a divide-by-ten like the other 74HC390 stages). Assume that
the counter has a value = zero. The next negative edge of U4A
will then toggle both the divide-by-two and divide-by-five stages
of U4B high. Instead of waiting for the stage to count, it is
reset by the 2's bit from U4A at 0.2 sec (and reset again for
good measure at 0.6 seconds). Hence both the Q1 & Q2 outputs
from U4B are 0.2 second wide 1PPS signals. U5D acts as an output
buffer for one of these two outputs, while the other is used as
a LED driver for the Red half of the 2-color LED. Since the LED
should be Green, it will appear to flash orange for the first
200 msec of the counter's second.

(5) Some folks have a 5 MHz xtal or Rb. The U5A+U6B circuit acts as
a simple frequency doubler. The R4C2 network should have a time
constant ~ 1/4 of the input signal period (i.e. ~25 nsec for a 10
MHz input or ~50 nsec for a 5 MHz input) minus one 74HC14 gate
delay time (~8 nsec). This means C3 should be ~100 pf for 10 MHz
or ~220 pf for 5 MHz. If you need to use the doubler to drive the
counter chain, change the jumper.

One reason for making 20 MHz from a 10 MHz standard is that several Kenwood &
ICOM radios have 20.0000 MHz master oscillators. This
doubler also provides a simple detector function that indicates
that the input has some sort of AC signal present. If the signal
is not present, regardless of the up/down state of U6A, both inputs
to U5A will be the same, and the output will be a zero. Only if an
AC input signal is present will the output of U5A go positive for
~50% of the time, lighting the LED labeled INPUT.

(6) At the top of the drawing is a large header jumper area. I have
selected 24 outputs from the divider chain that may be useful for
you. These are the 1,4 & 8 bits from the counters. The 1's bit is
a useful divide-by-2 that gives frequencies like 5 MHz, 500 kHz, etc.
The 4's bit is a nearly square wave (60%/40% duty cycle) at freqs
like 1 MHz, 100 kHz, etc. The 8's output is at the same frequency
as the 4's output, but it has an 80/20 duty cycle. The 2's bit is
useless for most of my applications, but you could add it if needed.
You put a jumper across any of the 24 outputs to select the desired
output from the U5C Utility Output buffer. The 2-pin jumper on U5C
allows the output to be inverted.

(7) The C4R9 and C5R10 differentiators drive U6E and U6F to produce
1 usec wide pulses. These are designed to feed the simple analog
comparator I'll describe subsequently. Two section in each U6 and
U7 are unused. Don't worry -- they are needed to generate the
switched-capacitor clock for the simple analog TOC I've been
working on.

(8) Other comments: In case you wonder about the 47 ohm series
resistors and diodes associated with the 10 MHz & GPS 1PPS inputs --
If the input was hit with a signal > 5v pk-to-pk, the CMOS inputs
would be overdriven, possibly ringing, and possibly being damaged.
The HC and AC series logic both have protective diodes built into
the chip, but I don't trust them. The series resistor acts as a
current limiter and the diodes help the chip's protective diodes
to absorb the jolt. Some of the older HP Rb & Cs clocks has a
20 volt 1PPS output pulse and it made me paranoid!. Also, since the
GPS pulse input is AC coupled and the time constant is relatively
short, the trailing hedge will generate a BIG spike that goes
well beyond the supply rails.

U5 shows as a 74AC86, only because I have some AC86's on hand. It
should work fine with an HC86. Because there are several places that
RC time constants are used in this circuit, I wanted U6 & U7 to be
Schmidt triggers, but the AC logic series seems to not include 74AC14
and 74AC132 parts. The 74HC390s are also not available in AC logic.

Since the input signal ripples thru 28 stages of dividers = 56 gates,
the input-to-output counter delay will be several hundred nsec. A
synchronous divider chain would eliminate this delay, but we can
also simply account for it in our timing work as a bias.

73, Tom

176. DGPSIB not work

From: "Chan Siu Kwing Albert" <askchan@HK.Super.NET>
Date: Wed, 22 Apr 1998 00:07:37 +0800
To: <tacgps@tapr.org>
Message-ID: <01bd6d3f$9a219020$022240ca@safari-plus>
Rendered body type: text/plain

I had programed the Oncore VP for DGPS operations using TAC32. The Oncore is outputting data dut the DGPSIB appears to be not working. The LED is not toggling on and off. I had tried reset the mircocontroller by grounding pin 1 of it momentarily but it still not work. Can anybody tell me what is the problem?

177. Re: [TACGPS:1408] A Counter for your Rb/xtal

From: "Ira A. Wilner" <bdcst@vermontel.com>
Date: Tue, 21 Apr 1998 21:35:57 -0500
To: "Tom Clark (W3IWI)" <tac@clark.net>, tacgps@tapr.org
Message-ID: <199804220130.VAA25022@eureka.vermontel.com>
Rendered body type: text/plain

> Date: Tue, 21 Apr 1998 14:19:41 -0500 (CDT)
> Reply-to: tacgps@tapr.org
> From: "Tom Clark (W3IWI)" <tac@clark.net>
> To: tacgps@tapr.org
> Subject: [TACGPS:1408] A Counter for your Rb/xtal

Hello Tom,

I'd like to see DIP switches in place of the headers for selecting
divider outputs. Maybe the switches can be located where they could
be accessed through a window in a case or cabinet for the TOC?

73,

Ira

178. Re: [TACGPS:1408] A Counter for your Rb/xtal

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Wed, 22 Apr 1998 02:05:50 +0100
To: bdcst@vermontel.com, tacgps@tapr.org
Cc: Tom Clark <tac@clark.net>
Message-ID: <353D507E.D6D4EC8A@clark.net>
Rendered body type: text/plain

Ira Wilner wrote:
> I'd like to see DIP switches in place of the headers for selecting
> divider outputs. Maybe the switches can be located where they could
> be accessed through a window in a case or cabinet for the TOC?

Two comments:
 a. Although this divider might find its way into the TOC, I posted
    it as a sketch of what you could do TODAY in order to make use
    of the Rb standards. Although it isn't decided for sure, I
    would not be surprised to see all this logic, plus other "glue"
    burned into an FPGA for the "real" TOC. In that case, there will
    probably be a couple of multiplexers so that you can grab a
    couple of selected outputs in the FPGA also.

 b. I though of using DIP switches in this "quick 'n dirty" divider
    but they would have nearly doubled the real-estate required, and
    they would cost about the same as most of the other parts. The
    0.1" push-on jumpers seemed to be a good alternative. Of course,
    if you have the switches on hand and want to use them in your
    clone, feel free.

One minor omission in the counters.pdf drawing: I intended to have
a 2-pin option jumper across C3 to allow for a DC-coupled GPS 1PPS
signal.

{ BTW -- TACGPS seems to be very slow the past couple of days -- it
  took nearly a day for my [TACGPS:1408] posting to get back to me.
  Your note was addressed to both TACGPS & my ISP address, so I got
  it quickly. }

73, Tom

179. Re: [TACGPS:1409] DGPSIB not work

From: "Doug McKinney" <buoy@redshift.com>
Date: Tue, 21 Apr 1998 20:52:41 -0700
To: <tacgps@tapr.org>
Message-ID: <002601bd6da2$2e08cc60$ccc6cccf@buoy.mcktech.com>

Rendered body type: text/plain

-----Original Message-----
From: Chan Siu Kwing Albert <askchan@hk.super.net>
To: tacgps@tapr.org <tacgps@tapr.org>
Date: Tuesday, April 21, 1998 12:48 PM
Subject: [TACGPS:1409] DGPSIB not work

>This is a multi-part message in MIME format.
>
>------=_NextPart_000_0008_01BD6D82.A844D020
>Content-Type: text/plain;
> charset="iso-8859-1"
>Content-Transfer-Encoding: quoted-printable
>
>I had programed the Oncore VP for DGPS operations using TAC32. The =
>Oncore is outputting data dut the DGPSIB appears to be not working. The =
>LED is not toggling on and off. I had tried reset the mircocontroller by =
>grounding pin 1 of it momentarily but it still not work. Can anybody =
>tell me what is the problem?

Can only try to help. If you were tracking satillites and the aTAC32 DGPS
was selected (use 5 second rate) and you were outputting data, I would
connect a volt meter accross the LED leads and see if the voltage was
changing. If you are using 5 second up date, then the LED will be cycling
on for 5 sec and off 5 second. If the volt meter shows voltage changes,
then suspect a bad LED. Also notice that the LED traces are too thin. We
have found that any force on the LED can break the printed circuit traces,
so check the continuity from LED lead to the other end of the printed
circuit board from where the trace started (the most likely problem. The
DGPSIB Manual on page 8 shows what a RTCM-104 output looks like, are you
getting a data output from the DIFF output?

Lets see how this helps
Doug

>
>------=_NextPart_000_0008_01BD6D82.A844D020
>Content-Type: text/html;
> charset="iso-8859-1"
>Content-Transfer-Encoding: quoted-printable
>
><!DOCTYPE HTML PUBLIC "-//W3C//DTD W3 HTML//EN">
><HTML>
><HEAD>
>
><META content=3Dtext/html;charset=3Diso-8859-1 =
>http-equiv=3DContent-Type>
><META content=3D'"MSHTML 4.71.1712.3"' name=3DGENERATOR>
></HEAD>
><BODY bgColor=3D#ffffff>
><DIV><FONT color=3D#000000 size=3D2>I had programed the Oncore VP for =
>DGPS=20
>operations using TAC32. The Oncore is outputting data dut the DGPSIB =
>appears to=20
>be not working. The LED is not toggling on and off. I had tried reset =
>the=20
>mircocontroller by grounding pin 1 of it momentarily but it still not =
>work. Can=20
>anybody tell me what is the problem?</FONT></DIV></BODY></HTML>
>
>------=_NextPart_000_0008_01BD6D82.A844D020--
>

180. Re: [TACGPS:1409] DGPSIB not work

From: Robert Winingham <kc5ejk@onramp.net>
Date: Tue, 21 Apr 1998 23:28:42 -0600
To: tacgps@tapr.org
Cc: askchan@hk.super.net
Message-ID: <v03102801b1632c557b70@[206.50.200.83]>
Rendered body type: text/plain

>From: "Chan Siu Kwing Albert" <askchan@hk.super.net>

>I had programed the Oncore VP for DGPS operations using TAC32. The Oncore is
>outputting data dut the DGPSIB appears to be not working. The LED is not
>toggling on and off. I had tried reset the mircocontroller by grounding
>pin 1 of it momentarily but it still not work. Can anybody tell me what
>is the problem?

I had problems reading your HTML mail message. The people with
better information might not be able to read your message.

You might need to send a screen dump (to Tom Clark or Richard Hambly)
of what you see using TAC32 and say which version of the TAC32
program you have tried.

I use a RS-232 test box between the DGPSIB and the computer
to gain extra operational information.

A computer terminal program can verify that RTCM is coming out
from the DGPSIB . The RTCM data is not readable but will line up on the screen
as it has normal ACSII RETURN/line feed at the end.

Regards,

Bob - Dallas,TX --- kc5ejk@onramp.net or kc5ejk@amsat.org ---

181. Re: [TACGPS:1413] Re: DGPSIB not work

From: Steve Sampson <ssampson@access.usa-site.net>
Date: Wed, 22 Apr 1998 02:39:33 -0500
To: tacgps@tapr.org
Message-ID: <353D9EB5.B1B1435C@access.usa-site.net>
Rendered body type: text/plain

Robert Winingham wrote:
>
> I had problems reading your HTML mail message. The people with
> better information might not be able to read your message.

You might want to ask your ISP for a copy of Netscape or Microsoft
Explorer. Works fine for any kind of mail.

Steve

182. Re: A counter for your Rb/xtal

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Wed, 22 Apr 1998 13:18:41 -0400
To: "TAC-2 mail list" <tacgps@tapr.org>
Message-ID: <000001bd6e12$b2224920$481f5c18@john.tampabay.rr.com>
Rendered body type: text/plain

Tom -- The schematic of your counter/divider looks great. Am convinced that
.PDF format was a good choice.

Sometime ago you mentioned that you had a nifty circuit for generating
harmonics up into the GHz range. I would like to multiply my 10 MHz standard
up to ~1 GHz so I could get better resolution when trying to measure it
directly with a good HP counter with a GHz plug-in and a solid time base.
Wondering how you select the harmonic you want to measure.

Any help would be appreciated. Thanks.

73, John W4SF

183. Re: [TACGPS:1415] Re: A counter for your Rb/xtal

From: Kenneth Lerman <Kenneth.Lerman@lerman.nai.net>
Date: Wed, 22 Apr 1998 15:35:22 -0400 (EDT)
To: tacgps@tapr.org
Message-ID: <199804221935.AA28054@lerman.nai.net>
Rendered body type: text/plain

>
> Tom -- The schematic of your counter/divider looks great. Am convinced that
> .PDF format was a good choice.
>
> Sometime ago you mentioned that you had a nifty circuit for generating
> harmonics up into the GHz range. I would like to multiply my 10 MHz standard
> up to ~1 GHz so I could get better resolution when trying to measure it
> directly with a good HP counter with a GHz plug-in and a solid time base.
> Wondering how you select the harmonic you want to measure.
>
> Any help would be appreciated. Thanks.

>
> 73, John W4SF
>
>

I think I would divide the source I wanted to measure DOWN to give me
one pulse per ten thousand seconds or so and use it to gate my
standard into a counter. If I had a 10Mhz standard, I would expect
100 * 10^9 counts, more or less.

Ken

--
Kenneth Lerman   Kenneth.Lerman@lerman.nai.net
Systems Essentials Limited   Fax: (203)426-9138
55 Main Street   Voice: (203)426-4430
Newtown, CT 06470   http://lerman.nai.net/~lerman
PGP fingerprint = B1 66 29 FB CB 8C 6A 24 E1 DF B4 63 2C D6 5D AD

184. Re: [TACGPS:1412] Re: DGPSIB not work

From: "Steven R. Bible" <srbible@gate.net>
Date: Wed, 22 Apr 1998 17:47:53 -0400
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19980422174753.008748c0@pop.gate.net>
Rendered body type: text/plain

At 11:01 PM 4/21/98 -0500, you wrote:
>
>-----Original Message-----
>From: Chan Siu Kwing Albert <askchan@hk.super.net>
>To: tacgps@tapr.org <tacgps@tapr.org>
>Date: Tuesday, April 21, 1998 12:48 PM
>Subject: [TACGPS:1409] DGPSIB not work
>
>>I had programed the Oncore VP for DGPS operations using TAC32. The =
>>Oncore is outputting data dut the DGPSIB appears to be not working. The =
>>LED is not toggling on and off. I had tried reset the mircocontroller by =
>>grounding pin 1 of it momentarily but it still not work. Can anybody =
>>tell me what is the problem?

Some things to look for:

 - Make sure you have selected "Mot Bin" in the set serial of TAC32.

 - Was the DGPS box check-marked on TAC32? Then click OK.

 - Check that the LED is good. When the LED toggles, you are sending out
RTCM data. You can verify this by connecting the DGPSIB to a terminal
program.

 - Steve, N7HPR
 (n7hpr@tapr.org)

185. RE: [TACGPS:1416] Re: A counter for your Rb/xtal

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Wed, 22 Apr 1998 20:40:41 -0400
To: <tacgps@tapr.org>
Message-ID: <000001bd6e50$713241c0$481f5c18@john.tampabay.rr.com>
Rendered body type: text/plain

Ken -- You are right. By using a 10ksec. gate time I could measure my 10MHz
standard to a resolution of 10E11 but I would have to wait almost 3 hours
between readings. By going the other way, that is multiplying the 10MHz up
to 1GHz I would get the same resolution of 10E11 but I would only have to
wait 100sec. between readings. That is the only advantage of using the
higher frequency.

Thanks for your response.

John

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Kenneth
Lerman

Sent: Wednesday, April 22, 1998 3:38 PM
To: tacgps@tapr.org
Subject: [TACGPS:1416] Re: A counter for your Rb/xtal

>
> Tom -- The schematic of your counter/divider looks great. Am convinced
that
> .PDF format was a good choice.
>
> Sometime ago you mentioned that you had a nifty circuit for generating
> harmonics up into the GHz range. I would like to multiply my 10 MHz
standard
> up to ~1 GHz so I could get better resolution when trying to measure it
> directly with a good HP counter with a GHz plug-in and a solid time base.
> Wondering how you select the harmonic you want to measure.
>
> Any help would be appreciated. Thanks.
>
> 73, John W4SF
>
>

I think I would divide the source I wanted to measure DOWN to give me
one pulse per ten thousand seconds or so and use it to gate my
standard into a counter. If I had a 10Mhz standard, I would expect
100 * 10^9 counts, more or less.

Ken

--
Kenneth Lerman   Kenneth.Lerman@lerman.nai.net
Systems Essentials Limited   Fax: (203)426-9138
55 Main Street   Voice: (203)426-4430
Newtown, CT 06470   http://lerman.nai.net/~lerman
PGP fingerprint = B1 66 29 FB CB 8C 6A 24 E1 DF B4 63 2C D6 5D AD

186. Re: Hello,

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Thu, 23 Apr 1998 16:19:35 -0400
To: "Ken (by way of Greg Jones, WD5IVD)" <rube2@ix.netcom.com>
Cc: clark@tomcat.gsfc.nasa.gov, TACGPS Mailing List <tacgps@tapr.org>,
        Greg Jones <wd5ivd@tapr.org>
Message-ID: <353FA257.D8B03BEC@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Ken Rae W0POP wrote:

> On a IBM Attiva Machine in dos windows, when running Showtime, I get the
>
> following error message: "Device unavailable in line 1 of module
> SHWTM33D at address 1906:3B89" Gps 70 works fine.
> The Showtime program works fine on an old 286 machine but fails on
> Pentium 266 Machine by IBM. Could this be a needed upgrade in the
> software? What am I missing?

Apparently you are trying to run SHOWTIME in Windows. If it is Windows NT,
it is >>GUARANTEED<< to fail since NT runs its hardware I/O ports in
protected mode. SHOWTIME sorta runs in W95/98 but it is a kludge. You
should go to the [SYSTEM] icon in [Control Panel], then to [Device
Manager] and go to the COM1 or COM2 port in use, hit [Port Settings]
and make sure that Hardware Handshaking is selected, and then click
[Advanced] and crank the 16550 RX buffering down. SHOWTIME was never
written for Windoze, and its ability to survive seems to be very dependent
on quirks of your machine.

SHOWTIME has been static and unchanged for nearly 2 years. It works OK
in nude MessDOS and under DesqView for most people. Rather than re-writing
SHOWTIME for Windoze, one of our other TACers, Rick Hambly (WB2TNL) has
transferred all the SHOWTIME functionality to the Windows 95/98/NT
environment and added a number of nice new features in his TAC32 program.

Rather than you wasting your time trying to get SHOWTIME to work on your
machine, and rather than me wasting my time trying to diagnose a problem
remotely, my STRONG advice is that you download the new TAC32 software
and use it. Here is all you do:
   a) Go to Rick's Web Site at http://www.cnssys.com -- there you will see
      Rick's CNS Clock as a professional, wired, FCC certified version of
      the TAC-2.

b) click on the [TAC32 SOFTWARE] line to see a description of TAC32
c) click on the [download a copy] and follow Rick's instructions
or you can do the same thing by going to http://www.tapr.org and clicking
on the [TAC32 SOFTWARE] button. If you like TAC32 and want to remove the
"Unregistered Copy", you can register your copy thru the TAPR web site.

In summary -- treat SHOWTIME as a derelict antique. Use TAC32 instead!

73, Tom

187. Garmin ramblings

From: "Eric A. Cottrell" <eac@shore.net>
Date: Thu, 23 Apr 1998 22:16:05 -0400
To: tacgps@tapr.org
Message-ID: <353FF5E5.4311@shore.net>
Rendered body type: text/plain

Hello,

I found the GPS-20 thread interesting as I got a GPS-10 still
in the box, a GPS-45 and a GPS 12xl. I use the Delorme
Tripmate as a backup 8->. Sounds like the GPS-20 has a
little logic bug in the almanac update code. I wonder
if the 45 has it as well.

I shipped my Garmin 12xl with 2.01 firmware off to Garmin
for a brain transplant. You send the receiver to them,
pay them 100 dollars and they will ship back a unit
with the latest hardware and firmware platform. Current
version is 4.0 that has a cities database and a basic
map of borders and coastline (as far as I can tell).
A good deal as I do not have to sell the 12xl for
$100 bucks and combine this with $250 for the new
map display stuff. Also Garmin has software
upgrades (as an experiment) on their web site.
It only upgrades certain firware versions.

So I dug out the old Garmin 45 and found the batteries
were dead so the receiver thought that Jan 1, 2000
was already here. I did an autolocate which took over
1/2 hour to do even with the almanac uploaded. I noticed
some behavior that I wonder if the GPS-20 and other units
based on the old 8 channel multiplexed engine do the same.

The initial search is on one channel, that I can
understand. The unit gets the first satellite
reasonably quick and then the unit starts filling
the other channels with satellites it is searching
for. Basically it found 3 so it is searching 4
and up. It finds the 2nd satellite reasonably
quickly after the first lock (about the same
amount of time),

There seems to be some problems after the 2nd
satellite. About 10 to 15 minutes have passed
so I assume the unit has gotten most of the
almanac. It seems the unit has shifted it's
search method. It appears that the unit is
propagating the keplerian element set forward
to the year 2000. It seem to rank the
satellites in elevation order. Of course it
selects the wrong satellites and the satellites
on the position display do not match what is
above the horizon. It takes 15 to 20 minutes
additional to find the 3rd satellite.

One thing that puzzles me is that you can
enter your lat and long into the unit but
you cannot enter the time and date. Also
the unit does not seem to correct the
time until it locks into 3 satellites.

I guess autolocate is a low priority as
you only need it once. But I would
think that you can get a very good
estimate of visible satellites if you
can get close to the real time that one
or two satellites can give you, and know
the position of the satellites that you

are receiving. I guess my software side
is showing. 8->.

Having a true 12 channel receiver is alot better
but it looks like the autolocate search method was
improved as well in the 12xl. The Tripmate
has no Real-Time-Clock or Almanac storage at all
and it comes up within 5 to 10 minutes. I feel
that the time on the 45 could be cut to 15 to
20 minutes until the first 2D fix. Maybe it
was improved in later version as my 45 is
Version 2.41.

73 Eric eac@shore.net WB1HBU

188. Re: [TACGPS:1420] Garmin ramblings

From: "Ira A. Wilner" <bdcst@vermontel.com>
Date: Fri, 24 Apr 1998 12:59:47 -0500
To: "Eric A. Cottrell" <eac@shore.net>, tacgps@tapr.org
Message-ID: <199804241653.MAA15630@eureka.vermontel.com>
Rendered body type: text/plain

> Date: Thu, 23 Apr 1998 22:17:29 -0500 (CDT)
> Reply-to: tacgps@tapr.org
> From: "Eric A. Cottrell" <eac@shore.net>
> To: tacgps@tapr.org
> Subject: [TACGPS:1420] Garmin ramblings

> The Tripmate
> has no Real-Time-Clock or Almanac storage at all
> and it comes up within 5 to 10 minutes.

Eric, many of the newer GPS engines can do cold starts in under 3
minutes! There is a new class of GPS engine being developed for low
cost mass produced built-in automotive navigation systems. Not only
do they do a fast cold initialization, they also have a sleep mode
when the car ignition is turned off wherein they periodically awaken
and take a fix. That way when you get into your car and start the
engine, the GPS will lock up and start navigating within seconds.

Of course, if you park in an underground garage you sort of defeat
this capability. :-)

--Ira (W1IRA)

189. Garmin upgrades

From: "Eric A. Cottrell" <eac@shore.net>
Date: Sat, 25 Apr 1998 19:39:54 -0500
To: tacgps@tapr.org
Message-ID: <3542825A.4D8B@shore.net>
Rendered body type: text/plain

Hello,

There seems to be some interest in the Garmin
firmware upgrades. I got this information
from the sci.geo.satellite-nav newsgroup.

The following is an important point:
Garmin does changes in the hardware as well
as software changes between versions. Post
hardware change firmware will not work on
the old hardware.

If you have, for example a 12xl version 2.01
there is no upgrade for it on the web site.
If you upload the website file to your 12xl
it will most likely not work, you will have
to send it back for repair, and Garmin will
has another reason for not offering upgrades
on the web site because people do not follow
instructions. For $30 dollars you can do a
firmware only upgrade to version 3.02.
For $100 dollars you can get a upgrade to
the current hardware and firmware (4.0).

The URL I have for the downloadable
upgrades is:

http://support.garmin.com

I seem to have some trouble connecting to it.

73 Eric eac@shore.net WB1HBU

190. Re: [TACGPS:1422] Garmin upgrades

From: "Ira A. Wilner" <bdcst@vermontel.com>
Date: Sat, 25 Apr 1998 23:11:22 -0500
To: tacgps@tapr.org
Message-ID: <199804261328.JAA26145@eureka.vermontel.com>
Rendered body type: text/plain

> Date: Sat, 25 Apr 1998 19:41:07 -0500 (CDT)
> Reply-to: tacgps@tapr.org
> From: "Eric A. Cottrell" <eac@shore.net>
> To: tacgps@tapr.org
> Subject: [TACGPS:1422] Garmin upgrades

(SNIP)

> If you upload the website file to your 12xl
> it will most likely not work, you will have
> to send it back for repair, and Garmin will
> has another reason for not offering upgrades
> on the web site because people do not follow
> instructions.

Eric,

I've followed the threads about Garmin and complaints about not
having the opportunity to upgrade flashroms without sending units
back to the factory. Fear of idiots attempting to upgrade with the
wrong code downloaded from a manufacturers website is bogus if the
upgrade software is written intelligently.

I call you attention to 3Com/USR's program to upgrade their modems to
either X2 or V.90 over the Internet. You download an upgrade wizard
from them. It determines whether your hardware is upgradeable and
whether you qualify for a free upgrade or have to pay for it. It
then will place a call to the factory BBS and download the correct
firmware and do the upgrade after dropping off line of course.

A similar approach could be used by any manufacturer of EEPROM
programmable hardware containing a communications port.

--Ira (W1IRA)

191. Re: [TACGPS:1423] Re: Garmin upgrades

From: "Eric A. Cottrell" <eac@shore.net>
Date: Sun, 26 Apr 1998 10:56:36 -0500
To: tacgps@tapr.org
Message-ID: <35435934.584D@shore.net>
Rendered body type: text/plain

Ira A. Wilner wrote:
> Eric,
>
> I've followed the threads about Garmin and complaints about not
> having the opportunity to upgrade flashroms without sending units
> back to the factory. Fear of idiots attempting to upgrade with the
> wrong code downloaded from a manufacturers website is bogus if the
> upgrade software is written intelligently.

Yes that is true but I was not going to test out the theory. Given
past experience with Garmin I do not want to help kill the golden
goose so to speak.

If the software was taken from a factory setting then it is possible
such checks were not put in because it was meant for internal use.
I can say from experience that this is sometimes the case with
my company's software. Checking would also depend on some method
of determining the existing hardware and/or firmware levels in the
unit. It may have been done but if you originally intended to
use it with factory staff only then it may be considered extra work
to put it in.

73 Eric eac@shore.net WB1HBU

192. Re: [TACGPS:1424] Re: Garmin upgrades

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Sun, 26 Apr 1998 17:19:13 +0100
To: tacgps@tapr.org
Message-ID: <35436C91.E611F050@clark.net>
Rendered body type: text/plain

Eric and Ira had this dialogue:
> > I've followed the threads about Garmin and complaints about not
> > having the opportunity to upgrade flashroms without sending units
> > back to the factory. Fear of idiots attempting to upgrade with the
> > wrong code downloaded from a manufacturers website is bogus if the
> > upgrade software is written intelligently.
>
> Yes that is true but I was not going to test out the theory. Given
> past experience with Garmin I do not want to help kill the golden
> goose so to speak.

I picked up the II+ update from the Garmin web site and it upgraded
a v2.04 to v2.07 with no problem, running the .EXE file from a MessDOS
window in W95. The only slightly annoying thing was that the GRMN/GRMN
protocol is pretty slow -- it took about 8 minutes to upload. The II+
restared itself fine afterwards. The updates for the 12XL and II+
can be found at http://support.garmin.com/ (this is the bookmark I
have for the site, but the support site seems to be offline today).
I have not seen any other user-installable updates for other Garmin
products.

FYI -- US Robotics pulled their V90 update for PCMCIA modems off the
Megahertz web site because of the problems some people had experienced
trying to do the update when running a laptop from batteries with
Power Management enabled. I tried to surf to the USR site to get
the V.90 update for my XJ1560 and it ain't there.

73, Tom

193. Re: [TACGPS:1425] Re: Garmin upgrades

From: "Eric A. Cottrell" <eac@shore.net>
Date: Sun, 26 Apr 1998 13:47:28 -0500
To: tacgps@tapr.org
Message-ID: <35438140.2F5C@shore.net>
Rendered body type: text/plain

Tom Clark (W3IWI) wrote:
>
> Eric and Ira had this dialogue:
> > > I've followed the threads about Garmin and complaints about not
> > > having the opportunity to upgrade flashroms without sending units
> > > back to the factory. Fear of idiots attempting to upgrade with the
> > > wrong code downloaded from a manufacturers website is bogus if the
> > > upgrade software is written intelligently.
> >
> > Yes that is true but I was not going to test out the theory. Given
> > past experience with Garmin I do not want to help kill the golden
> > goose so to speak.
>
> I picked up the II+ update from the Garmin web site and it upgraded
> a v2.04 to v2.07 with no problem, running the .EXE file from a MessDOS
> window in W95. The only slightly annoying thing was that the GRMN/GRMN
> protocol is pretty slow -- it took about 8 minutes to upload. The II+

Hello,

Unfortunely my 12XL is too old. I guess any GPS that is over a year
old is obsolete 8->. If they put older versions like 3.02 up on the
site then I would consider trying it out. It was suspected on the NG
some time ago that there was a firmware upload method via Garmin
protocol.

I do not think $30 is too costly for a firmware upgrade and I am
glad to be able to update the hardware for $100. I also think
it is neat that if you bought a garmin within the last 60 days
and it is not the current firmware revision, you can get it
updated for $0 (this apparently includes hardware updates as well).
There appears to be at least 2 hardware changes to the 12xl since
my unit. I suppose that is the price of getting one of the first
units.

I was looking at the new Garmin units but I think the upgraded 12xl
will met my needs. I am heading off to the UK this summer and plan
on using the GPS for navigation.

73 Eric eac@shore.net WB1HBU

194. Re: [TACGPS:1425] Re: Garmin upgrades

From: "Ira A. Wilner" <bdcst@vermontel.com>
Date: Mon, 27 Apr 1998 00:41:15 -0500
To: tacgps@tapr.org
Message-ID: <199804270434.AAA10382@eureka.vermontel.com>
Rendered body type: text/plain

> Date: Sun, 26 Apr 1998 12:22:46 -0500 (CDT)
> Reply-to: tacgps@tapr.org
> From: "Tom Clark (W3IWI)" <tac@clark.net>
> To: tacgps@tapr.org
> Subject: [TACGPS:1425] Re: Garmin upgrades

> FYI -- US Robotics pulled their V90 update for PCMCIA modems off the
> Megahertz web site because of the problems some people had experienced
> trying to do the update when running a laptop from batteries with
> Power Management enabled. I tried to surf to the USR site to get
> the V.90 update for my XJ1560 and it ain't there.

Interesting, Tom. Obviously where there's a will there's a way to
wreck even a well thought out upgrade scenario. Imagine being in
the middle of your modem upgrade when the power goes out. And I'm
not just talking about a laptop under battery management, but a
desktop PC without an UPS. I would hope that the upgrade
application would be smart enough to write an INI file with the
progress of an upgrade so it could restart if the power glitched,
knowing that the firmware was no longer valid in the product. Else
you could run into Catch-22. Try the upgrade again and the software
will report that the modem in question is invalid and cannot be
upgraded as the present firmware is not the correct version!

BTW, the USR/3Com upgrades for the Courier V.Everything modems work
very well. Even so, I felt a bit nervous when I upgraded mine. :-)

73, Ira

195. Re: [TACGPS:1427] Re: Garmin upgrades

From: "Eric A. Cottrell" <eac@shore.net>
Date: Mon, 27 Apr 1998 09:57:31 -0500
To: tacgps@tapr.org
Message-ID: <35449CDB.2506@shore.net>
Rendered body type: text/plain

Ira A. Wilner wrote:
> Interesting, Tom. Obviously where there's a will there's a way to
> wreck even a well thought out upgrade scenario. Imagine being in
> the middle of your modem upgrade when the power goes out. And I'm
> not just talking about a laptop under battery management, but a
> desktop PC without an UPS. I would hope that the upgrade
> application would be smart enough to write an INI file with the
> progress of an upgrade so it could restart if the power glitched,
> knowing that the firmware was no longer valid in the product. Else
> you could run into Catch-22. Try the upgrade again and the software
> will report that the modem in question is invalid and cannot be
> upgraded as the present firmware is not the correct version!

Hello,

I have some insight into this as my company uses EEPROM for firmware.
The eeprom is usually divided into several banks. The stuff we
deal with will only erase on a bank level. Because operations are
critical you usually will erase and start from the beginning because
even if you could save the last location you do not know if that
location and surrounding ones where written correctly.   It is better
to start from a known state (erase it all and begin again).
We have header information stored that contains checksums so the
instrument and the upgrade program can tell if a module is good.

The real tricky part is when you have to replace the boot loader
as you are replacing the code doing the transfer on the instrument
end. I noticed on some other systems this is in Rom or the EEPROM
write enable for that bank is disabled. If the boot loader
gets corrupted than you need to tear the unit apart and either

replace the EEPROM or reprogram it via a EEPROM programer.

Some digitial satellite systems like DVB and DC2 also support
firmware upgrade via the digital stream coming from the satellite.
I have seen a DSR-4200 upgraded via this method and it was interesting
seeing numbers count up and down as different firmware modules got
updated. After the upgrade the bootloader version number did not change.

73 Eric eac@shore.net WB1HBU

196. Re: [TACGPS:1428] Re: Garmin upgrades

From: "Ira A. Wilner" <bdcst@vermontel.com>
Date: Mon, 27 Apr 1998 17:46:11 -0500
To: tacgps@tapr.org
Message-ID: <199804272139.RAA28797@eureka.vermontel.com>
Rendered body type: text/plain

> Date: Mon, 27 Apr 1998 13:20:09 -0500 (CDT)
> Reply-to: tacgps@tapr.org
> From: "Eric A. Cottrell" <eac@shore.net>
> To: tacgps@tapr.org
> Subject: [TACGPS:1428] Re: Garmin upgrades
(SNIP)

> Some digitial satellite systems like DVB and DC2 also support
> firmware upgrade via the digital stream coming from the satellite.
> I have seen a DSR-4200 upgraded via this method and it was interesting
> seeing numbers count up and down as different firmware modules got
> updated. After the upgrade the bootloader version number did not change.

Indeed, I was involved with probably one of the early adaptations of
remote system downloading via satellite. When National Public Radio
launched its original satellite program delivery system back in 1977,
each affiliate was equipped with proprietary microcomputers, built by
the Canadian firm AVL. Obviously this predates the IBM PC.

Each AVL computer had a gel cell battery for internal power backup,
a switching power supply, modest memory and several serial ports,
some RS-232C and others twisted pair RS-422. They automated the
process of tuning demodulators and starting audio tape recorders to
capture programs for live or delayed broadcast. They also buffered a
program schedule and two way messaging system with printers at each
affiliate. Return messages were sent by dialup modem. Each computer
would also send time of day packets to clocks around the stations,
synchronizing them to the computer's real time clock which was in
turn synchronized periodically to NPR time.

Ironically, this first attempt at remote real time multitasking
automation systems worked far more smoothly than their contemporary
replacement, IBM PCs running IBM OS2! The original timekeeping
maintained split second accuracy with the mother ship, NPR. But
today, though the same time packets are sent out to the same local
clocks, the second by second jitter from the OS2 PC's is +or- 2
seconds! Yuck! It makes a simple crystal timebase look good!
This is an example of a clock with excellent long term stability but
exceedingly poor short term stability. :-)

The bootstrap or bootload code (early BIOS?) in the AVL computer
resided in ROM. If the operating code became corrupt or upon command
from NPR headquarters, the computer would go into "look for download"
mode. Downloads were sent several times a day on a regular basis or
you could ask for an extra download as required. It worked like a
charm. But that's an example of a closed system. The provider knows
exactly what hardware is being supported.

73,

Ira (W1IRA)

197. Re: [TACGPS:1429] Re: Garmin upgrades

From: "Eric A. Cottrell" <eac@shore.net>
Date: Tue, 28 Apr 1998 12:08:51 -0500
To: tacgps@tapr.org
Message-ID: <35460D22.3F65@shore.net>
Rendered body type: text/plain

Ira A. Wilner wrote:

> Indeed, I was involved with probably one of the early adaptations of

> remote system downloading via satellite. When National Public Radio
> launched its original satellite program delivery system back in 1977,
> each affiliate was equipped with proprietary microcomputers, built by
> the Canadian firm AVL. Obviously this predates the IBM PC.

I used to listen to the USNO master clock and other NPR channels on
Analog SCPC. I did it because even with at least two NPR stations
in Boston none of them had Thistle and Shamrock. Now NPR is using
digital Comstream equipment.

Most of the TV networks use this stuff for all kinds of remote
control (even pointing their satellite dishes). Wegner makes
equipment.

> Ironically, this first attempt at remote real time multitasking
> automation systems worked far more smoothly than their contemporary
> replacement, IBM PCs running IBM OS2! The original timekeeping
> maintained split second accuracy with the mother ship, NPR. But
> today, though the same time packets are sent out to the same local
> clocks, the second by second jitter from the OS2 PC's is +or- 2
> seconds! Yuck! It makes a simple crystal timebase look good!
> This is an example of a clock with excellent long term stability but
> exceedingly poor short term stability. :-)

Part of it is due to OS/2 not being a real time OS. You could do
somewhat better if the priorities of the processes are set properly.
With the AVL you would have to do the multitasking in the program.
More work but you can control the details so it would work well.
MSDOS could do it as well because you have to write the multtasking.
Win 3.1 tends to be worse as it uses cooperative multitasking and
not time slice.

I worked on GPS receiver code implemented in MSDOS. It had a simple
multitasking system in it but it worked. It would be more difficult
to implement in windows.

73 Eric eac@shore.net WB1HBU

198. TAC32 Version 1.2.3 Released

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Tue, 28 Apr 1998 23:14:22 -0400
To: <tacgps@tapr.org>, <gpsdev@tapr.org>
Message-ID: <000301bd731c$e7fae520$101161cf@rick.cnssys.com>
Rendered body type: text/plain

Version 1.2.3 of the TAC32 software is now available at
http://www.cnssys.com/tac32/
Information on both TAC32 and the CNS Clock are available at
http://www.cnssys.com/

Version 1.2.3, April 28, 1998   RELEASE NOTES:

Features: There is a new Satellite Azimuth / Elevation (visibility) polar
plot chart (View / View Satellite Az-El Chart) that provides a visual status
of satellite location and movement. Place the cursor over a satellite icon
to see details. The satellite icons are color coded - green for rising, red
for setting and blue for unknown.

The toolbar has been redesigned to enhance ease of use.

Performance: Probing for the existence of serial ports is now done only once
and the results are stored. This speeds up subsequent program
initialization. If you change your serial port hardware configuration use
the new Probe for Serial Ports button in the Edit/Set Serial Port dialog
box.

When TAC32 fails to find an active GPS receiver on the selected serial port
it will stop issuing initialization commands and will display an instructive
message to the user.

Corrections: Position averaging now suspends height averaging during periods
of 2-D navigation.

Corrected an error that would cause TAC32's communication thread to lock up
if another program had initialized the GPS receiver to send @@Bl commands.

Corrected an error that would cause TAC32 to crash if certain illegal data
was detected in the NMEA $GPZDA or $GPRMC messages. This happens whenever a
Motorola Oncore GT+ looses satellite lock (like when the antenna is

disconnected). It does not occur with the Motorola Oncore VP or Garmin receivers.

Eliminated a problem where the PC clock would get set twice every second to slightly different values if the NMEA message set took almost exactly one second to send.

Corrected a problem with the satellite data display when using a Motorola Oncore GT+ receiver in NMEA mode (works differently than the Oncore VP).

When switching from a Motorola Oncore VP to a Motorola GT+ by resetting using the serial port dialog but not restarting TAC32, when both are in NMEA mode, now results in the correct setup parameters being applied. For example, if the VP was in 0-D navigation mode, the GT+ will be placed in 2-D mode (it has no 0-D mode).

Help Files: Updated the help files to reflect these changes

Rick
WB2TNL

Richard M. Hambly
CNS Systems, Inc.
(410) 987-7835
http://www.cnssys.com/

199. enclosure for TAC-2

From: "Ira A. Wilner" <bdcst@vermontel.com>
Date: Thu, 30 Apr 1998 00:36:29 -0500
To: tacgps@tapr.org
Message-ID: <199804300429.AAA21185@eureka.vermontel.com>
Rendered body type: text/plain

For those looking for a case that is nicer than the cheap sheet metal port switchboxes, I found an inexpensive, easy to machine enclosure for the TAC-2. Though it is a bit larger than ideal, it has the qualities of being easy to machine (plastic) and excellent EMI shielding, metallic threads embedded in the plastic.

Check out the Serpac products distributed by DigiKey, specifically item # 172E-B-ND.

--Ira

200. TAC: Accuracy & Precision Comments

From: "Tom Clark (W3IWI)" <tac@clark.net>
Date: Thu, 30 Apr 1998 21:21:50 +0100
To: Peter Dana <pdana@mail.utexas.edu>
Cc: TACGPS <tacgps@tapr.org>, Rick Hambly <rick@cnssys.com>,
Tom Clark <clark@tomcat.gsfc.nasa.gov>, Tom Clark <tac@clark.net>
Message-ID: <3548EB6E.54B34194@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Recently Rick Hambly exchanged some Email with Peter Dana, the well-known geographer at the Univ. of Texas who maintains the great "Geographer's Craft" web site (see for example his GPS material at URL http://www.utexas.edu/depts/grg/gcraft/notes/gps/gps.html).

[This note is addressed to Peter, but I'm copying the TAPR TACGPS group since I think they may find the information useful]

In that communication, my name and the TAC activity was mentioned, and I feel compelled to respond to Peter:

> [snip]
> Thirdly, and I have suggested this to Tom Clark before, the TAC and
> now CNS Clock continue to advertise a "1 PPS signal (up to 30 nsec
> accuracy)." With SA providing a 340 ns (two sigma) UTC accuracy
> (1996 Federal Radio Navigation Plan, page A-7), and the UTC
> correction term resolution specified by the ICD-GPS200C, 10 October
> 1993 (page 33) as maintaining a GPS-UTC relationship with 90 ns
> (one sigma); even without SA a 30 ns UTC 1 PPS is impossible.
> Furthermore, without SA and with GPS time alone as the standard,
> the 30 meter uncertainty in range and SV clock provides at best a
> 90 ns uncertainty even with a perfect position and GPS time (and
> the most sophisticated of ensemble and filtering techniques).
>
> Since the rest of us are having to specify realistic (and testable!)

> accuracies for both UTC and GPS time transfer, it seems wrong to
> continue to use 30ns as a published accuracy figure.
> [snip]
>
> Peter
>
> Peter H. Dana - Department of Geography - University of Texas at Austin
> Austin, Texas 78712-1098 - Tel: (512) 869-1450 - Fax: (512) 869-0899

Peter --

First, although I know of you professionally, Peter, I can't for the life of me recall any correspondence from you to justify your "and I have suggested this to Tom Clark before..." statement. But that's not an important point.

I don't take any exception to the ICD-200 and FRNP documentation. However, I take serious umbrage at your suggestion that our results are unrealistic and untestable! And I would to offer evidence that, in fact they are quite realistic and well tested!

By way of background, you may be aware that I have, for many years, directed NASA's program to use Very Long Baseline Interferometry (VLBI) for high accuracy geodesy and earth rotation studies (see some of our material at http://lupus.gsfc.nasa.gov). We operate some of the VLBI stations ourselves, and we coordinate a number of foreign organizations in their participation within the global network.

VLBI is probably the world's most stringent "reality" user of high accuracy time/frequency (outside of the national time-keepers like USNO), and every VLBI station is equipped with a Hydrogen Maser clock. The nature of VLBI requires that we have good epoch timing at each of these stations in order that the wide-band noise we record onto magnetic tape can be cross-correlated to produce the geodetic and astronomical data. In the earliest days of VLBI we carried portable clocks all around the world, and in some areas we could resort to Loran to keep the Maser clocks synchronized at the ~1 usec level (when we were lucky). In the 1980's, the first GPS-based timing systems became available (like the Trimble/FTS 8400, costing ~$30,000) became available and they immediately improved our performance to the ~300 nsec level everywhere in the world. In the 90's, the folks at NIST (like Judah Levine) began to use common-view GPS time synchronization and with carefully controlled measurements, coordinated between the two ends of a link, learned that they could achieve GPS timing results at the few nsec level.

Around 1993, two efforts began to see how far a simple, small, cheap GPS engine could be pushed. Mike King at Motorola (working with Mirhan Miranian at USNO), and I (working on my own) both found that there were "tricks" that could yield timing performance that was much more precise than had been achieved earlier. Both of us were working with the Motorola PVT-6 6-channel C/A code receiver (which has now been superseded by the 8-channel Motorola ONCORE VP).

I can speak most directly about my own work, so let me describe the "trick" that we "invented". The performance of a single GPS satellite (with SA enabled) does fit within the envelope defined by the FRNP and ICD-200 specifications. However, when you study the system, it becomes obvious that a ground-based clock at a fixed location can yield significantly better performance since the SA modulation is incoherent between the different satellites.

If your L1 C/A code receiver can process over-determined satellite data (i.e. data with some redundancy), then timing (and positioning) improves because SA noise is uncorrelated.

What evolved (and is the basis of all my TAC claims) was a scheme where we first determine the position of the observer by averaging over time (a day to several days recommended) to get a few meters of positional accuracy. Second, the receiver is then constrained to use this "good" position as "perfect", and all the pseudoranges go into the determination of clock parameters. If the position were known perfectly then we only require one satellite to get clock information. But the GPS constellation is now very robust and we always have at least 5 satellites in view and often more. Since the SA on each of the N satellites in use is incoherent, we have (N-1) extra degrees of freedom. If SA is statistically a zero-mean process, then the effect of SA is reduced by a factor ~sqrt(N-1). When we saw how good the GPS clock could be, we made ~50 available

to the geodesy/astronomy community and they are now in use at
observatories on every continent. As a joke -- in part because there
were at least two commercial "Most Accurate Clock" devices on sale
and we were getting ~4 orders-of-magnitude better performance, and
in part because my initials are TAC -- I dubbed the unit the "Totally
Accurate Clock"; not too professional, but it got people's attention!

As an example of changing a receiver from normal 3-D navigation
plus timing mode to "zero-D" timekeeping as a proof of the real world
performance, take a look at some data I took comparing one of my 6-channel TACs
with the Hydrogen Maser at the Onsala Space Observatory
in Sweden in 1995 at URL

  ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/oso-d270.gif

In this plot, midway during Day#270 I changed the receiver from
normal "3-D" navigation to "zero-D" timekeeping operation [Someday
I need to fix this plot -- the units on the Y-axis are NANOSECONDS
even though the plot incorrectly says MICROSECONDS]. During the
period marked "setup" we measured the coaxial cables, and you will
note a small step change at the end of "setup". After constraining
the receiver, the next 6 weeks of results are seen in another plot,

  ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/oso-clk.gif

In this plot, the heavy black line shows 30 minute time-interval
averages of data that was averaged for 30 seconds in the HP53131A
counter. The red plot at the bottom shows the behavior of the RMS
of the 30 second samples within the 30 minute window, and the green/
blue marks show the extrema of the individual 30 second samples
within each 30 minute bin. The 30 second measurements have an average
"noise" level of 31.8 nsec (i.e. precision) over 6 weeks of time
when compared to a really stable atomic clock. On my aleph ftp site
you will find other examples that justify my claim that, in the
"testable", "real world" we in fact do achieve timing precision at
levels of ~20-30 nsec.

Now let me comment on ACCURACY. In 1993, both Mirhan and I worked
with Mike King to remove an instrumental bias in the original PVT-6
and PVT-6 & ONCORE receivers with firmware 5.x onward all have
been tested in numerous ways to show that they agree at the < 20
nsec level with the USNO master clock. As one independent test of
my claim, Joe Taylor (who received a Nobel Prize for his Pulsar
Timing work) and one of his Princeton students set up one of my TACs
at the Arecibo Observatory in Puerto Rico. For several years, Arecibo
had paid ~$5000/year to NIST for common-view GPS time synchronization.
Joe's student found that the TAC, costing < $1000 each, performed
about the same as the NIST service. In Joe's plot from Arecibo at

 ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/arecibo-tac.gif

we see that the TAC-to-NIST results have an average bias difference
of 16 nsec, with an RMS of 24 nsec, over a ~10 day period.

At NASA Goddard we have periodic traveling clock visitations to tie
our clocks to USNO across town. In addition, we have the ability to
compare clocks thru a TV "line 10" system and such measurements are
made daily. The last time I munched the numbers, any biases were
at the 20 nsec or less level. Therefore I claim that the 20-30 nsec
values also reflect proof of the "real-world" ACCURACY. Some day,
when we find a convenient common time, Mirhan and I plan to complete
this test by running a TAC at the USNO Master Clock.

In addition to the "zero-D", overdetermined, position constrained
operation, all these results have been obtained with some degree of
time-domain averaging. This is done, in part, because the ONCORE
receiver has an inherent 104 nsec peak-to-peak instrumental dither
(to get a feeling for this effect, see

 ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/tac-1sec.gif)

and in part because we have done a lot of work in measuring the power
spectrum of the SA variations. Your FRNP quote only addresses the
peak amplitude and not the spectrum. Our measurements (and those of
many others in the field) have shown that the SA dither is a band-
limited zero-mean process. The power spectrum extends from ~1 sec

at the high-frequency end down to ~1/2 hour at the low-frequency
end. Individual 1 second measurements show an RMS ~50 nsec due to
the combined effects of SA and the 104 nsec pk-to-pk instrumental
dither. At longer intervals, we smooth out the instrumental noise
and filter out the effects of SA. Since I have access to the H-Masers,
I have measured the Allan Variance we actually achieve and these are
seen in the plot at URL

   ftp://aleph.gsfc.nasa.gov/GPS/toc/allanv.pdf

The other issue to be addressed regarding accuracy is paraphrased
"How good does DoD keep the GPS constellation as a clock?". Since
the "zero-D" technique relies on the aggregate performance of the
entire GPS constellation, we rely on the USNO for this part of
the "magic". The USNO gives the part 30 days of UTC(USNO) vs GPS
in graphical form at

       http://tycho.usno.navy.mil/gif/utcgps.gif

and in tabular form at

       ftp://tycho.usno.navy.mil/pub/gps/gpsv3.dat .

Typically the GPS constellation is held within ~+/- 20 nsec and
over the last month, it is in a < 10 nsec wide band centered on
about -10 nsec.

All the results I've described were obtained with the old original
6-channel Motorola PVT-6 receivers. I hope you will agree that the
tests and performance I've described represent the "real-world" and
that you now understand the basis for my claims.

After I put ~50 of the original 6-channel TACs out to the geodesy
and astronomy world, I did a new version to support the newer 8-
channel Motorola ONCORE VP receivers (and several other board-level
OEM GPS receivers), and I gave the design to TAPR to make available
to the world (see http://www.tapr.org and click on the TAC-2 button).
The commercial CNS Clock (that Rick corresponded with you about, seen
at URL http://www.cnssys.com) is a "Cadillac" packaged version of
my TAPR TAC-2 that has received FCC certification.

Regards,
Dr Thomas A Clark
NASA Goddard Space Flight Center
clark@tomcat.gsfc.nasa.gov

201. Re: Accuracy & Precision Comments

From: Dr Thomas A Clark <clark@tomcat.gsfc.nasa.gov>
Date: Fri, 01 May 1998 03:51:30 +0100
To: "Peter H. Dana" <pdana@mail.utexas.edu>
Cc: TACGPS <tacgps@tapr.org>, Rick Hambly <rick@cnssys.com>,
        Tom Clark <clark@tomcat.gsfc.nasa.gov>, Tom Clark <tac@clark.net>
Message-ID: <354946C2.876CE172@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

As a follow-up on my previous message, Peter sent this rapid reply:

> Tom:
>   I trust you will forward this to your group as you did my message
> to Rick.

Will do -- this is the posting with my interspersed comments.
>
>>First, although I know of you professionally, Peter, I can't for the
>>life of me recall any correspondence from you to justify your "and I
>>have suggested this to Tom Clark before..." statement. But that's not
>>an important point.
>
> I disagree - I would rather you not take umbrage at something you first
> brought to my attention that I responded to in some detail (I assume that
> you never received my reply - I did not get a further response from you).

My apologies -- I had forgotten this brief exchange we had 2+ years ago. It
didn't show up when I did a search before writing my response. Guess I'm
getting
absent minded in my old age.

>   I have pasted below (after the rest of my reply) the text of your
> initial message to me and my reply to you (for those who wonder what we are
> referring to by Inverted SA, that was merely a program used on one day, April 1,
> 1996, to disseminate DGPS corrections using the SA control mechanisms).
>
>>I don't take any exception to the ICD-200 and FRNP documentation.
>>However, I take serious umbrage at your suggestion that our results
>>are unrealistic and untestable! And I would to offer evidence that,
>>in fact they are quite realistic and well tested!
>
>   My point is very simple: I think that one should not specify
> accuracies achieved occasionally (or even most of the time) in the field when
> these same accuracies are not guaranteed by the specifications of the system
> you use as the basis for your measurements. In the old days we knew that
> Loran-C was often held to within 24 ns of UTC, we could not use that as a
> specification for equipment because we could not promise it. If the GPS
> specifications allow for 90 ns time transfer, then even though one can very
> often do better, it seems wrong to use the 30 ns figure.

I agree that we are operating at levels better than the GPS system specs.
Perhaps things are working better than they guarantee! In my "real world"
I was pleasantly surprised to see how well we could track the performance
of our atomic standards with such a simple and cheap solution. I can assure
you that the results I have shown are obtained far more than "occasionally"
or even "most of the time" -- in point of fact they are obtained routinely.
My professional community trusts my TAC (and receivers made by TRAK) as
operational systems, and I cannot think of a time that they have ever failed
us.

>
>   You say that SA is incoherent. I measure long intervals when
> statistically SA is very determined and has an ensemble bias of 40-100ns.
> Without a specification of SA "incoherence" I don't see how you can promise
> it to users.

I glossed over this because I didn't want to make my earlier message longer
than
it already was. My "incoherent" statement applied to the cross-correlation of
the SA dither on satellite (x) vs. that on satellite (y). My test of this
hypothesis has relied on observing various receiver's observed pseudorange (PR)
errors; this has been most easily done by using DGPS PR values generated by
the receiver. What I have found is that when such a receiver is observing N
satellites, the cross correlation coefficient never differs (in a statistically
significant sense) from 1/(N-1). Since the receiver must determine its
internal clock error even when the position is constrained (i.e. what I call
"zero-D" navigation), and all N satellites are used (approximately equally) to
get the internal clock, the apparent cross-correlation at a 1/(N-1) level is
to be expected. [And, if I were designing SA for DoD's application, I can't
conceive of any reason to have any satellite-to-satellite coherence of the
dithering! But then, DoD isn't always logical about such things.]

You are correct that there can be temporal "wandering" bias. The lowest
frequency in the SA modulation spectrum appears to be ~1/2 hour based on
measurements I made a couple of years ago; some information I have gleaned
indicates that the number is actually 2048 sec. (If anyone has other info
on this topic, please speak up). The effects of this low frequency "die out"
after about 5 time constants, so I have recommended people who really want
best performance should smooth the timing with 10,000 sec or ~3 hour windows.
At semidiurnal periods, orbital errors start to be observed, and the
ionosphere can show up as a diurnal signature. The best example of such
really long averaging involves my VLBI station near Fairbanks, AK at URL

    ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/gcgo-tac.gif

(with explanations in the accompanying gcgo-tac.txt file). The blue trace on
this plot has 5-minute averaging with ~31 nsec RMS. The red curve has been
passed thru a one-sided exponential filter with ~2 hour time constant; over
this period, the RMS of the red curve is 9.2 nsec, but there are clearly
periods with significant correlations over hours. Of course in Alaska, we
have periods when the ionosphere can be pretty bizarre. And the GPS
constellation itself shows day-to-day wandering at levels up to 10 nsec as
seen in the USNO "Constellation as a clock" plot noted in my previous message.
So I wasn't surprised at all to see some correlated noise. In fact I was
ecstatic (and pleasantly surprised) to see a TAC GPS vs. H-Maser tracking
each other this well.

> None of this mattered much when the TAC was "given away." As a commercial
> product it should be held to the same standards as any other vendor's claims.
> My friends at Allen's Time, Auston, Bancomm, TrueTime, and NIST have all

> avoided using 30ns for direct reference time transfer simply because it is
> wrong to do so. All of these folks are using ensemble techniques to reduce
> SA, but none (to my knowledge) specify what they achieve in practice - rather
> they specify what they can promise the user.

Everything I've done personally is in the public domain. After I announced
the TAC, I was inundated with requests I couldn't meet being at a Gov't lab
(even though much of the TAC work was a personal "basement inventor" "labor
of love" project). So when I did the TAC-2 I gave the design to the not-for-
profit amateur R&D group TAPR with the stipulation that they make it available
to anyone in the scientific community that wanted it. With that went the rights
for TAPR to market it, and Rick Hambly picked up the design for his CNS Clock.
In return, he made some significant enhancements to my antique & outdated
MSDOS support software which he has made available as (licensable) shareware.

In their data sheet for the ONCORE VP, Motorola states that the timing
accuracy of the 1PPS output is "In position hold mode, < 50 nsec 1-sigma with
SA on". HP uses the ONCORE in their 58503A disciplined crystal and quote a
similar performance spec. In every piece of information I have written, I
think I have been careful to say words like "we have observed performance
of 30-50 nsec, and with careful measurements as good as 20 nsec RMS".

So I guess that the semantic problem we are having is that it looks to me
like you want to invoke the ultra conservative "guaranteed" performance values
that the DoD promised because of safety-of-life requirements on the GPS
system, while many of us are willing to work with significantly better
"typical" and "observed" numbers in the real world.

> I have outlined my take in:
> Dana, Peter H. 1997. Global Positioning system (GPS) Time Dissemination
> for Real-Time Applications. Real-Time Systems: The International Journal of
> Time Critical Computing Systems. 12. No. 1 (January).

Never saw the paper -- that's a journal I don't normally see. Can you perhaps
send me a reprint? Or better still -- is it on your web site? If its not on the
web, my mailing address is

    Dr Thomas A Clark
    Geoscience Technology Office
    Code 920.3
    NASA Goddard Space Flight Center
    Greenbelt MD 20771

Peter then replayed the Email exchange we had 2+ years ago, which I had
forgotten and apparently never responded to:

>> Date: Sun, 31 Mar 1996 10:13:51 +0000
>> From: Tom Clark <clark@tomcat.gsfc.nasa.gov>
>> Organization: NASA Goddard
>> To: pdana@mail.utexas.edu
>> Subject: Your WWW Site
>> X-URL: http://www.utexas.edu/depts/grg/gcraft/notes/gps/gps.html#Contents
>>
>> Hi Peter -- just scanned your web site for the first time. Looks nice.
>>
>> One item that may be of interest -- in common-mode time transfer, you
>> state ~10 nsec can be achieved -- it's actually better than that.
>>
>> However I've been working on the "isolated station" time transfer/sync
>> problem. Even with a small (but good) single-frequency CA code receiver
>> I'm getting ~30 nsec. The project has the tongue-in-cheek name "Totally
>> Accurate Clock" and info can be seen on my ftp server
>>
>>   ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/
>>
>> Just as a reference point, the Observatory at Arecibo (PR) was paying
>> NIST ~$5k/year for common-mode time sync. Joe Taylor (who got the Nobel
>> Prize in Physics for his Pulsar Timing work) put one of my ~$1000 TACs
>> at Arecibo and the TAC does as well as (and maybe better) than the NIST
>> service! Their latest run against a hydrogen maser got 22.4 nsec RMS.
>>
>> All this DESPITE SA.
>>
>> Found your "inverted SA" report interesting.
>
> To: Tom Clark <clark@tomcat.gsfc.nasa.gov>
> From: pdana@mail.utexas.edu (Peter H. Dana)
> Subject: Re: Your WWW Site

>
> Tom:
>   Thank you for your interest in the Geographer's Craft GPS page.
>
> >One item that may be of interest -- in common-mode time transfer, you
> >state ~10 nsec can be achieved -- it's actually better than that.
>
>   I don't know of any but some experimental, short baseline proof of
> concept work that suggests better than 10 ns in "real" situations. Please lead
> me to some references, I have not been to PTTI for years and the ION proceedings
> show no <10 ns common-mode work. I just finished a paper for the Journal, Real
> Time Systems (Klewer - coming out in a month or so) on GPS Time Dissemination
> for Real Time Systems. I talked with folks from NIST, USNO, HP, Allen's Time,
> Datum, Austron, True-Time and others and nobody will claim better than 10 ns
> of common-mode accuracy for three reasons. Multipath, ionospheric spatail
> de-correlation and an inability to prove the accuracy at those precsions.
> For long baseline work (>300 km) better than 10ns seems very tough to do and
> tougher to prove. What do you think?
>
>>However I've been working on the "isolated station" time transfer/sync
>>problem. Even with a small (but good) single-frequency CA code receiver
>>I'm getting ~30 nsec. The project has the tongue-in-cheek name "Totally
>>Accurate Clock" and info can be seen on my ftp server
>>
>>   ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/
>
>   I had looked over your TAC some time ago and wondered how you can
> get these remarkable numbers? I have consulted for Austron for a while,
> helped designed their first non-NBS GPS timing receiver in 1983 and recently
> did some work on the new PRR-10. They have never been able to do that well
> even with very long term averaging over all SVS. We see and all the reports
> I read still indicate that SA still has frequency components that don't
> "average out" for hours. Even when we filter individual pseudo-ranges before
> combining them into a time solution we find it difficult to do better than the
> square root of 8 (8sv) * the SA errors of 300ns or about 100ns. Then too we
> cannot quote time transfer other than GPS time because the conversion to UTC
> (from broadcast data) limits UTC to 94 ns. Ionospheric delays alone give us
> uncertainties of more than 30 ns.
>
>>Just as a reference point, the Observatory at Arecibo (PR) was paying
>>NIST ~$5k/year for common-mode time sync. Joe Taylor (who got the Nobel
>>Prize in Physics for his Pulsar Timing work) put one of my ~$1000 TACs
>>at Arecibo and the TAC does as well as (and maybe better) than the NIST
>>service! Their latest run against a hydrogen maser got 22.4 nsec RMS.
>
>   I just looked at a note on your site - have I confused something?
> You seem to report 24 nanoseconds of precision and 150 ns peak to peak.
> Precision isn't much use to us - accuracy is what we need and if you do have
> normal numbers, how can 150 ns peak to peak not indicate something more like
> 50 ns for a standard deviation. I guess a better way to ask is what is the
> standard deviation of these direct transfer timing values and how do you test
> them?
>
>   I apologize for being a little skeptical and for not having read
> more of the materials on your site. I think 30ns is great and don't mind
> losing the race to better technology - but I do have a problem when we have
> to compete with numbers that we can't match and that customers demand without
> having a way to really compare.
>
>>Found your "inverted SA" report interesting.
>
>   Not a bad period of time during which to be a little skeptical don't
> you think? I have noted that since I put that up yesterday I have read in
> newspapers stuff just about as "inverted" in what I take to be serious
> attempts at reporting the GPS news. Seems all your work was for nothing
> if CNN reports that without SA you can get one meter positioning with stand-
> alone GPS.
>
> Peter

End historical dump. If I had responded to Peter's 2-year old questions, I
probably would have made the following points:

  - Yes the ionosphere is one of the limiting error sources. The ONCORE (and
    hence the TAC) do make use of the broadcast ionosphere correction, which
    gets rid of about half of the variability. Perhaps in 2004, we will solve
    this problem when something like the CA code appears on the L2 frequency!

  - Multipath effects do appear as a station dependent bias source, but they

are repeatable. Certainly they need to be worried about at the 10 nsec level.

- The ~150-200 nsec pk-to-pk always seems to be higher than the RMSs would indicate. I think this is because there are some short-period "glitches" that show up occasionally, perhaps due to receiver problems when new satellites are acquired, and perhaps due to the extrema of SA, and perhaps due to the receiver's internal (Kalman?) tracking filters not coping with transients. When the histograms are plotted, there are always a few straggler points that don't persist for long. If I had access to the individual 1 second numbers, the "glitches" would have been edited out by applying a N-sigma "reasonability" test (with N somewhere in the 6-10 range). Unfortunately the counters "eat" these occasional bogus points into their time-interval-averages. Since I went over to the HP53131A counters, I at least get a report of the max/min/sigma of all the values that go into a long average (I typically use 100 seconds).

- My criticism of your comment on 300/sqrt(8) nsec is that 300 nsec is a PEAK value. The FRNP states a max of 340 nsec 2-sigma for worst case 3-D navigation. The RMS value (which I have always be careful to specify) for 1 second timing seems to be more like 100 nsec, so ~100 nsec/sqrt(N-1) is in the 40-50 nsec range at 1 second. Then given time-domain smoothing to ~100 seconds, we get the 30ish nsec performance every time we measure it. The noise does not drop as sqrt(100) because the samples are not independent (i.e. the autocorrelation drops slowly out to lags of ~1/2 hour). The Allan Variance plot I pointed to on aleph reflects this.

- I don't understand your "cannot quote time transfer other than GPS time because the conversion to UTC (from broadcast data) limits UTC to 94 ns" statement. The geodetic community's (IGS) experience is that the broadcast ephemerides are good at the ~10 meter level. The broadcast message contains A0 epoch and A1 rate corrections for each satellite that are typically accurate at a few tens of nsec. Random satellite-to-satellite broadcast message errors seem to be independent. And the USNO "Constellation as a Clock" plots show that the constellation is routinely kept accurate at the 10-20 nsec level.

So I still stand by my comments that timing accuracy and precision in the 30ish nsec range are achieved in practice, in the real-world. My only caveat is that the user should follow the "cookbook recipe" that I have prescribed in setting up a TAC. That recipe is in the file on aleph, and edited versions are in the material distributed by TAPR with the TAC-2 and in Rick's CNS Clock manual. It is on aleph at URL

ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/success.tac

Regards, Tom

May 1998

Original source file: tacgps.9805
Source: http://ftp.tapr.org/product_docs/TAC2/mail_archives/tacgps.9805

1. TAC32 Version 1.2.4 Released

```
From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sat, 2 May 1998 10:17:22 -0400
To: <tacgps@tapr.org>, <gpsdev@tapr.org>
Message-ID: <000001bd75d5$06371940$101161cf@rick.cnssys.com>
Rendered body type: text/plain
```

Version 1.2.4 of the TAC32 software is now available at
http://www.cnssys.com/tac32/
Information on both TAC32 and the CNS Clock are available at
http://www.cnssys.com/

Version 1.2.4, May 2, 1998   RELEASE NOTES:

Features: Changed the satellite colors on the Az-El graph to Blue for rising (approaching), Red for setting (departing) and Cyan for Unknown. This reflects the astronomer's bias towards describing these states in terms of "red-blue shift" rather than the engineer's bias towards "good-bad" (green-red).

Added signal strength (Eb/No) to the pop-up windows on the satellite Az-El chart.

Corrections: Improved the operation of the "Probe for New Ports" button in the "Serial Port Settings" dialog box.

Revised the "Receiver not found" warning box to have only one button, "OK".

Changed a label on the main screen from "GPS Time" to UTC Time from GPS" to be more precise.

Corrected an error interpreting and displaying the station ID in the DGPS being received message.

Revised the initialization for Garmin receivers. Some receivers seem to play by a different set of rules, like the GPS-III.

Rick
WB2TNL

Richard M. Hambly
CNS Systems, Inc.
(410) 987-7835
http://www.cnssys.com/

2. Dayton 1998 TAPR Digital Forum and Pack*Bash

```
From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Sat, 2 May 1998 10:54:47 -0500
To: "HF SIG  list   mailing"<hfsig@tapr.org>, " Spread Spectrum "<ss@tapr.org>,
        " TAPR/AMSAT DSP "<dsp@tapr.org>,
        "APRS SIG  list   mailing"<aprssig@tapr.org>,
        "NETSIG  list   mailing"<netsig@tapr.org>,
        "BBS SIG  list   mailing"<bbssig@tapr.org>,
        " tacgps "<tacgps@tapr.org>, aprsnews@tapr.org, mic-e@tapr.org,
        TAPR Regional Freq <regional_freq@tapr.org>
Message-ID: <v04003a02b170efeb4e04@[207.8.125.50]>
Rendered body type: text/plain
```

Dayton 1998 TAPR Digital Forum and PACK*BASH

Dayton Hamvention will be here later this month. Just as a reminder, the TAPR Digital Forum is on Friday and this year starts much earlier than in years past. In addition, the PacketBASH banquet will be held on Friday night.

If you haven't been to Dayton before, you should think about coming this year. The dates for this year are May 15th - 17th. Check out the web page http://www.tapr.org/tapr/html/dayton.html for any last minute changes in the schedule.

The schedule for the TAPR digital forum on Friday is:

10:00 - 10:05am (5 min)
        Introduction to Forum
        John Ackermann, N8UR

10:05 - 10:25am (20 min)
        TAPR Kit/Project/Organizational Update - Greg Jones , WD5IVD
        TAPR Update and discussion on current activities.

10:25 - 10:45am (20 min)
        Regulatory Issues - Dewayne Hendricks, WA8DZP
        Update on Regulatory Issues related to Digital activity.

10:45 - 11:30am (45 min)
        TAPR 900Mhz FHSS Radio Project
        Tom McDermott, N5EG / Greg Jones, WD5IVD
        Latest Information on Status and design of 900Mhz FHSS Radio Design.

11:30 - 12:15pm (45 min)
        GPS Projects - Steve Bible, N7HPR / Tom Clark, W3IWI
        TAPR has introduced several GPS related items in the last year.
        DGPS, GPS Interface boards, TAC-2, Future TOC add-on, etc

12:15 - 12:30pm (15 min)
        Break

12:30 - 1:00pm (30 min)
        Linux AX.25 - John Ackermann, N8UR
        Making AX.25 play on Linux

1:00pm - 1:45pm (60 min)
        APRS SIG and APRS Update
        Stan Horzepa, WA1LOU, APRS SIG Chair with the APRS Authors
        SIG meeting discussing current and future activities in APRS.

PACK*BASH and TAPR Banquet

Attending the 1998 Dayton Hamvention? Then don't miss out on PACK*BASH and
TAPR Banquet.

What?
        An event for the digitally-inclined ham, featuring:
                * Buffet dinner
                * Speaker Doug McKinney, KC3RL
                      discussing GPS and his Bouy projects in the Pacific
                * TAPR special interest group meetings
                * Prize Drawing!

When?
        Friday evening, May 15, 1998
        Doors open at 7:00 pm; dinner served at 7:30 pm
        Speaker and meetings after dinner

Where?
        NCR "Sugarcamp" Conference Center, 101 W. Schantz Ave. --
        South of downtown Dayton, just west of Main St. (Rt 48).
        Maps available on the TAPR web site or at the TAPR booth.
        (http://www.tapr.org/tapr/html/dayton.html)

How?
        Dinner requires advance registration and payment through TAPR.
        Tickets will be available at the TAPR booth on Friday, though
        we strongly encourage registration <before> Hamvention. The cost
        is $20.00 per person, tax and tip included.

        All amateurs are welcome to attend, enjoy the speaker, and
        participate in the meetings, although only those purchasing a
        dinner can eat.

        To register, contact:
                PACK*BASH
                c/o TAPR
                8987-309 E. Tanque Verde Road #337
                Tucson, AZ   85749-9399

Phone: (940) 383-0000
Fax: (940) 566-2544
Internet: tapr@tapr.org

Visa/Mastercard Accepted

Who?
PACK*BASH is co-sponsored by TAPR -- Tucson Amateur Packet
Radio, the national leader in digital communication -- and the
Miami Valley FM Association, Dayton's packet radio club.

For more information (including maps), go to
http://www.tapr.org/tapr/html/dayton.html, or send e-mail to
tapr@tapr.org. You can request information via packet radio at
BASH@N8ACV.#DAY.OH.USA.NOAM.

Tucson Amateur Packet Radio
8987-309 E Tanque Verde Rd #337 * Tucson, Az * 85749-9399
---
e-mail: tapr@tapr.org web: <http://www.tapr.org/>
ftp: ftp.tapr.org
phone: 940-383-0000 fax: 940-565-2544
---

3. TAC32

From: "Charles E. Heisler K3VDB" <cheisler@cyberia.com>
Date: Sat, 02 May 1998 19:51:01 -0400
To: tacgps@tapr.org
Message-ID: <199805030051.5690400@cyberia.com>
Rendered body type: text/plain

I would be interested to here from any one who;

Has TAC32 ver.1.2.3 or 1.2.4 up and running with a Garmin GPS-20.

TAC32 will not communicate properly with my GPS-20 since TAC32
ver. 1.2.0. After talking with Rick, I suspect I have a problem with
my TAC-2 board. However I would like to be sure no one else is
having a problem.

Thank You
Charlie K3VDB

4. RE: [TACGPS:1437] TAC32

From: "Alan Biddle" <APBIDDLE@att.net>
Date: Sun, 3 May 1998 00:27:21 -0000
To: <tacgps@tapr.org>
Message-ID: <000001bd762a$3cc6afc0$2945450c@system>
Rendered body type: text/plain

Charlie,

I use the GPS-20, and it has worked fine for me with TAC32, including the
latest update. You might try a general purpose communications program and
see if you can copy the raw data.

Alan
WA4SCA

5. Re: [TACGPS:1438] RE: TAC32

From: "Charles E. Heisler K3VDB" <cheisler@cyberia.com>
Date: Sat, 02 May 1998 20:49:45 -0400
To: tacgps@tapr.org
Message-ID: <199805030150.5717000@cyberia.com>
Rendered body type: text/html

At 07:28 PM 5/2/98 -0500, you wrote:

>Charlie,

>

>I use the GPS-20, and it has worked fine for me with TAC32, including
the

>latest update. You might try a general purpose communications
program and

>see if you can copy the raw data.

Thanks Allen, But TAC32 has worked fine for me up until ver.
1.2.3,

    and before that Showtime works good.

However Rick tells me in previous ver. it was not necessary for the
GPS-20

   to receive a set up command from TAC32. Which
indicates I may have

   trouble with the receive data side of my GPS-20 or TAC-2. I
was hoping

   that not be the case.

Thanks for your reply.

Charlie

Thanks for your reply

6. Re: [TACGPS:1439] RE: TAC32

From: Glenn Little <glittle@awod.com>
Date: Sat, 02 May 1998 21:06:40 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.16.19980502210640.370f6c04@awod.com>
Rendered body type: text/plain

Why did you send this in bandwidth wasting impossible to read with an email
reader HTML format??

At 07:56 PM 5/2/98 -0500, you wrote:
><html>
>At 07:28 PM 5/2/98 -0500, you wrote:
>>Charlie,
>>
>>I use the GPS-20, and it has worked fine for me with TAC32, including
>the
>>latest update.=A0 You might try a general purpose communications
>program and
>>see if you can copy the raw data.
>
>   Thanks Allen, But TAC32 has worked fine for me up until ver.
>1.2.3,
>   and before that Showtime works good.
> However Rick tells me in previous ver. it was not necessary for the
>GPS-20
>   to receive a set up command from TAC32. Which
>indicates I may have
>   trouble with the receive data side of my GPS-20 or TAC-2. I
>was hoping
>   that not be the case.
>
> Thanks for your reply.
>   Charlie
>
>
>
> Thanks for your reply
>   </html>
>
>
>

Glenn Little   glittle@awod.com   QCWA LM 28417
Amateur Callsign: WB4UIV   wb4uiv@amsat.org   AMSAT LM 2178
QTH: Goose Creek, SC USA (EM92xx)   ARRL TAPR
---

7. Re: [TACGPS:1437] TAC32

From: "Robert E. Martinson" <remartin@tiac.net>
Date: Sat, 02 May 1998 21:30:03 -0400
To: tacgps@tapr.org
Message-ID: <3.0.32.19980502212813.007a88b0@pop.tiac.net>
Rendered body type: text/plain

At 07:00 PM 5/2/98 -0500, you wrote:
>   I would be interested to here from any one who;
>
>   Has TAC32 ver.1.2.3 or 1.2.4 up and running with a Garmin GPS-20.
>
>   TAC32 will not communicate properly with my GPS-20 since TAC32
>   ver. 1.2.0. After talking with Rick, I suspect I have a problem with
>   my TAC-2 board. However I would like to be sure no one else is
>   having a problem.
>
>   Thank You
>   Charlie K3VDB
>
>

Hi Charlie,

My GPS-20/TAC-2 runs fine with TAC32s ver 1.2.4 except that if I turn on
ticks it indicates "lost lock", i.e. time display turns red.

Just tried it today.

73,
Bob Martinson
N1VQR@amsat.org

8. Re: [TACGPS:1441] Re: TAC32

From: "Charles E. Heisler K3VDB" <cheisler@cyberia.com>
Date: Sat, 02 May 1998 21:50:57 -0400
To: tacgps@tapr.org
Message-ID: <199805030251.5746900@cyberia.com>
Rendered body type: text/html

At 08:33 PM 5/2/98 -0500, you wrote:

>Hi Charlie,

>

>My GPS-20/TAC-2 runs fine with TAC32s ver 1.2.4 except that if I turn
on

>ticks it indicates "lost lock", i.e. time display turns
red.

>

>Just tried it today.

>

Thanks Bob,   I think I would report that one to Rick.

9. For Sale : AllStar GPS module

From: "Michael R. Owen" <nlsa@nlsa.com>
Date: Sun, 03 May 1998 09:14:16 -0400
To: tacgps@tapr.org
Message-ID: <354C6DA8.2DF1@nlsa.com>
Rendered body type: text/plain

Friends,

I have a Canadian Marconi AllStar 12-channel OEM module for sale. It is
absolutely new in a sealed package and includes programming module,
power supply, antenna, and documentation. Features include 1 PPS
output and carrier phase output option. Originally $800, asking $600.
For more information see
http://www.marconi.ca/Docs/CMC/Components/allstare.html.

Michael R. Owen
W9IP
nlsa@nlsa.com

10. RE: [TACGPS:1437] TAC32

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Sun, 3 May 1998 10:00:25 -0400
To: <tacgps@tapr.org>
Message-ID: <000001bd769b$d2622de0$481f5c18@john.tampabay.rr.com>
Rendered body type: text/plain

Charlie -- Just a note from another TAC32 user. TAC32 has run perfectly with
my GPS-20 from day one. Installed ver. 1.2.4 today and likewise runs fine. I
don't experience the "lost lock" problem that Bob reports. You can always
use Win 95's HyperTerminal to view the raw data. Does a good job.

73 John W4SF

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Charles E.
Heisler K3VDB
Sent: Saturday, May 02, 1998 8:00 PM
To: tacgps@tapr.org
Subject: [TACGPS:1437] TAC32

I would be interested to here from any one who;

Has TAC32 ver.1.2.3 or 1.2.4 up and running with a Garmin GPS-20.

TAC32 will not communicate properly with my GPS-20 since TAC32
ver. 1.2.0. After talking with Rick, I suspect I have a problem with
my TAC-2 board. However I would like to be sure no one else is
having a problem.

Thank You
Charlie K3VDB

11. Re: [TACGPS:1444] RE: TAC32

From: "Charles E. Heisler K3VDB" <cheisler@cyberia.com>
Date: Sun, 03 May 1998 10:53:57 -0400
To: tacgps@tapr.org
Message-ID: <199805031555.6016100@cyberia.com>
Rendered body type: text/plain

At 09:03 AM 5/3/98 -0500, you wrote:
>Charlie -- Just a note from another TAC32 user. TAC32 has run perfectly with
>my GPS-20 from day one. Installed ver. 1.2.4 today and likewise runs fine. I
>don't experience the "lost lock" problem that Bob reports. You can always
>use Win 95's HyperTerminal to view the raw data. Does a good job.
>
>73 John W4SF
>
 TNX John
        Charlie K3VDB

12. SHOWTIME status/info

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Tue, 05 May 1998 11:45:57 -0400
To: bruce weitzman <bruce_weitzman@gw.proctor.pvt.k12.nh.us>,
        TACGPS Maiing List <tacgps@tapr.org>
Message-ID: <354F3435.2776269@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Among others, Bruce Weitzman wrote concerning SHOWTIME:

> Hi, I was wondering if the source code for showtime was available?
>
> Thanks,
> Bruce Weitzman
>
> "Learn To Live, Live To Learn"
> Proctor Academy
> Andover, NH

While Ron Catmur (VK5FY) from Down Under (does that make the USA be
Up Over?) asked:

> I have been running TAC-2 with a Garmin 20...it all seems to work fine
> BUT.....
> there's always a BUT......I cannot set local time, which here in South
> Australia is -9hrs 30 minutes.
>
> Like you, I prefer to use UTC, but it would be fb to be able to set the
> local time correctly.

Let me respond by addressing several issues concerning SHOWTIME:

1. I consider SHOWTIME as pretty much dead, antique and inactive
software. It is now well over a year since I touched the code.
I wrote SHOWTIME as a "quickie" to support my original TAC, able
to be run in nude MessDOS. It was written in compiled Microsoft
QuickBasic 4.5, and that compiler is no longer supported or
available. I'd really like people to consider SHOWTIME as a glimpse
into history. It has been totally replaced in the Windoze 95/98/NT
world by Rick's TAC32, and I continue to work with (on?) him with
suggestions, proddings, etc. SHOWTIME is still available, but I
have no intent to enhance it. (Sorry, Ron -- use TAC32 instead!)

2. SHOWTIME was built to test some concepts. The code is not as
clean or obvious that it is of much use to anyone but me without
a LOT of hand-holding. I think that I have documented all the
algorithms and concepts in the documents that accompany SHOWTIME.
Since therewas quite a bit of interest in the details of the
date/time/calendar algorithms I used (like converting YYMMDD HH:MM:SS
UTC into local & Greenwich sidereal time, generating MJD & GPS week
& Day-of-the-Year, etc) I did post that portion of the code
publicly several months ago.

My main reason for not publishing the source code is that I don't
want to be committed to answering questions like "Why in the hell
did you do this stupidity?" or "The code won't compile under Visual
Basic! Why didn't you write it in C--?" etc.

Some years ago I was "burned" when I published the "definitive"
elliptical satellite orbit program, written in NorthStar 8080 disk
basic. NorthStar was a good, but dialectically unique language and
Microsoft triumphed. Some others hacked the NorthStar code into
Microsoft Basic, and my ORBIT program was distributed for a number
of other machines (Apple][, Atari, Radio Shack's CoCo, etc.).
Even today I get a couple of requests (often worded as demands)
each year asking why my 18 year-old code won't run on the (ab)users's
CoCo (or even Sinclair ZX81!). Often these are from people who purloined
a copy from someone who paid AMSAT for a copy 15 years ago.

3. So for SHOWTIME I adopted the policy that I would control the
source code. I would not give it away to casual "I'm curious about
what you did" users simply because I don't want to feel obligated to
answer their questions.

I have given out a couple of copies to people who had a bona fide
need for it. One copy went to one of Joe Taylor's (K1JT) students
at Princeton who was doing a thesis at Arecibo using my TAC. One
copy went to Rick (WB2TNL) who used many of the algorithms in his
TAC32 code. If someone is doing serious work and needs my bits,
and is willing to make a contribution back to the community, the
code is available.

4. If you didn't get a copy of may CALENDAR.BAS calendar utilities
(along with a simple test program) as adapted from SHOWTIME, I just
refreshed them on my aleph file server at URL

   ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/calendar.bas

This code should run OK in any Microsoft (or similar) BASIC as it stands.

73, Tom

13. TAC32 Version 1.2.5 Released

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Tue, 5 May 1998 13:33:26 -0400
To: <tacgps@tapr.org>, <gpsdev@tapr.org>
Message-ID: <000101bd784b$e92d91c0$101161cf@rick.cnssys.com>
Rendered body type: text/plain

Version 1.2.5 of the TAC32 software is now available at
http://www.cnssys.com/tac32/
Information on both TAC32 and the CNS Clock are available at
http://www.cnssys.com/

Version 1.2.5, May 5, 1998   RELEASE NOTES:

Corrected a timing error that caused the UTC display and PC time setting, if
enabled, to be one second behind true UTC if the combination of Epoch Offset
and Intentional Extra Early Offset produced a Total 1PPS Offset From UTC
between 999.5 and 999.999999 msec (same as -0.5 to -0.000001 msec).

Improved the efficiency of the initialization and re-initialization process.
TAC32 now starts up quicker and responds very quickly to changes in its
configuration parameters.

Rick
WB2TNL

Richard M. Hambly
CNS Systems, Inc.
(410) 987-7835
http://www.cnssys.com/

14. TIC TAC TOC ???

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Tue, 05 May 1998 14:43:23 -0400
To: TACGPS Maiing List <tacgps@tapr.org>
Cc: Nick Witzell <nick@boreas.whoi.edu>
Message-ID: <354F5DCB.5D288365@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

The purpose for this note is to get a sounding from the folks
on TACGPS who have been interested in the TOC activity.

Since I have done some work in SETI, I have a motto "Absence
of Evidence is not Evidence of Absence!". I have been working
on the TOC -- it's just a bit premature to spend a lot of time
discussing it. Since there was a strong interest in a "simple,
minimalist TOC" that would yield ~1:10e9 performance at low
cost (as contrasted to a considerably more complex widget that
could discipline a good xtal or Rb to levels ~1:10e11), that's
where my efforts have been concentrated.

Yesterday I got a request from a TAC user asking about the TOC
status. It turns out that he needed a stable, GPS-referenced
1kPPS signal. That request got me thinking about why people
were interested in the TOC.

- One requirement is as a stable FREQUENCY source. People want
  a TOC to act as a time-base for their counters, as a signal
  source for microwave radios, etcetera.

- A different requirement is as a stable TIMING clock for
  synchronizing data acquisition, digital data clock recovery,
  etcetera.

Thinking about the implications of FREQUENCY vs TIMING differences,
I came to the "light bulb turns on!" realization that there was
a really simple way to do the TIMING job -- which in turn led to
the notion of the TIC (TAC Interpolated Clock).

Let me describe the basic TIC idea, using the 1kPPS request for
the purpose of discussion. You start with a cheap ($1) xtal can
1 MHz clock oscillator and follow it with 3 stages of BCD dividers.
The GPS 1PPS signal generates a "sliver" pulse that resets the
BCD chain once/sec. Lets assume that the 1 MHz oscillator is
accurate at the 1:10e4 level -- i.e. it has a frequency somewhere
in the range 999.9 to 1000.1 kHz. This is a pretty sloppy xtal,
equivalent to a wrist watch gaining/losing ~8 seconds/day.

If the xtal frequency is too high,then the BCD counter has already
"rolled over" when the GPS arrives and up to 100 of the 1MHz pulses
(100 usec) are discarded by the reset signal. The effect is that
the "gap" between pulse #999 and pulse #1000 is stretched out.

If the xtal frequency is too low, then the counter is still in the
#999 state when the GPS reset pulses forces it to end a bit early.

The net effect is a small amount of jitter in the pulse rep rate,
growing from zero at the start of the second up to a max of 100
usec (10% of the desired pulse rep rate) at the end of the second
(assuming a really gross 1:10e4 xtal error -- most xtal can
oscillators should be better). The total number of pulses during
each second is the desired 1000. In essence, we have used the
(relatively) crude 1 MHz xtal oscillator as an interpolator during
each second, and use GPS to keep the long-term timing epoch under
control -- thus the TIC name. A quick design of a 1kPPS TIC shows
that it needs only 3 ICs with a parts cost of < $10. If there was
enough demand, a TIC board would easily plug directly into the
TAC-2 expansion sockets.

I would like some feedback from the folks who want a GPS-based
TIMING signal. It would be useful to hear from you by filling
in the blanks below. Those of you who need a FREQUENCY reference
need not reply.

   a. I need a _____PPS timing signal for my application
      which is _________________.

   b. I can tolerate a "jitter" of ________(usec or %).

   c. The signal needs to have a _____% duty cycle with a
      ___Positive (or ___Negative) edge coincident with UTC.

   d. I __do (or ___don't) need the "zero" (UTC Second) pulse
      to have a different appearance than the other pulses.

73, Tom

15. Re: [TACGPS:1448] TIC TAC TOC ???

From: Tom Cox <trcox@worldnet.att.net>
Date: Tue, 5 May 1998 19:03:32 -0400
To: tacgps@tapr.org
Message-ID: <v04003a01b1754a166d1b@[12.66.5.180]>
Rendered body type: text/plain

At 1:46 PM -0500 5/5/98, Dr Thomas A Clark (W3IWI) surveyed:

>   a. I need a ____PPS timing signal for my application

        1 PPS.

>   which is

       the sheer joy of high accuracy timekeeping (understandable to
       those who share it, and probably not to those who don't.
>
>   b. I can tolerate a "jitter" of _______(usec or %).

        Don't care, so long as the seconds arrive on time.
>
>   c. The signal needs to have a _____% duty cycle with a
>   ___Positive (or ___Negative) edge coincident with UTC.

        No preference.
>
>   d. I __do (or ___don't) need the "zero" (UTC Second) pulse
>   to have a different appearance than the other pulses.

        Nice, but not mandatory.

16. Re: [TACGPS:1446] SHOWTIME status/info

From: Steve Sampson <ssampson@access.usa-site.net>
Date: Tue, 5 May 1998 19:41:50 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199805060041.TAA31507@access.usa-site.net>
Rendered body type: text/plain

I'm using TAC32, and being impartial, I can agree here. The
software is excellent, an inexpensive tool that adds value to
your GPS engine. With a few more upgrades I think the satellite
view will replace my need for SA Watch :-)

Now a question. I'm using TAC32 with my TAPR DGPS, and the
thought comes to me: why use the TAC board? The two seem to
satisfy the same purpose, i.e., power, serial, engine platform.

I hope I don't come off as anything more than interested in my
TAC board assumption there.

Steve

> Let me respond by addressing several issues concerning SHOWTIME:
>
> 1. I consider SHOWTIME as pretty much dead, antique and inactive
> software. It is now well over a year since I touched the code.
> I wrote SHOWTIME as a "quickie" to support my original TAC, able
> to be run in nude MessDOS. It was written in compiled Microsoft
> QuickBasic 4.5, and that compiler is no longer supported or
> available. I'd really like people to consider SHOWTIME as a glimpse
> into history. It has been totally replaced in the Windoze 95/98/NT
> world by Rick's TAC32, and I continue to work with (on?) him with
> suggestions, proddings, etc. SHOWTIME is still available, but I
> have no intent to enhance it. (Sorry, Ron -- use TAC32 instead!)

17. TIC TAC TOC survey

From: Tom Cox <trcox@worldnet.att.net>
Date: Tue, 5 May 1998 20:42:57 -0400
To: tacgps@tapr.org
Message-ID: <v04003a00b1756019428f@[12.66.3.103]>
Rendered body type: text/plain

Dr. Clark didn't ask, but I'd like to mention another TAC (or is it TOC?)
characteristic that I think would be very useful: the ability regulate the
rate of the local oscillator (clock), so that it would "do its best" during
periods when GPS signals were not available. The lowly Heathkit "Most
Accurate Clock" does this with WWV signals. If I understood the simple TOC
scheme that Dr. Clark outlined, it would seem not to have this ability.

18. Re: [TACGPS:1450] Re: SHOWTIME status/info

From: "Steven R. Bible" <srbible@gate.net>
Date: Wed, 06 May 1998 17:40:09 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980506174009.00974e10@pop.gate.net>
Rendered body type: text/plain

At 07:47 PM 5/5/98 -0500, you wrote:
>I'm using TAC32, and being impartial, I can agree here. The
>software is excellent, an inexpensive tool that adds value to
>your GPS engine. With a few more upgrades I think the satellite
>view will replace my need for SA Watch :-)
>
>Now a question. I'm using TAC32 with my TAPR DGPS, and the
>thought comes to me: why use the TAC board? The two seem to
>satisfy the same purpose, i.e., power, serial, engine platform.
>
>I hope I don't come off as anything more than interested in my
>TAC board assumption there.

This question has been asked before. The major advantage to the TAC-2 is
that it can interface with a number of different GPS receivers. Also, it
has the low-Z 1PPS signal, and the hooks for a TOC (and maybe TIC) daughter
boards that can plug into the TAC-2. Now you will have a high accuracy
oscillator with you TAC-2. The other boards (DGPSIB and VPGUTIB) do not
have these options.

I think you'll agree that TAC-32 goes beyond the boundaries of just the
timing aspects of the TAC-2. It is a multi-faceted tool. All together,
the GPS products TAPR has been able to introduce this past year have
enabled many people to do things you once could not.

19. GPS-20's $119

From: Bob Bruninga <bruninga@nadn.navy.mil>
Date: Wed, 6 May 1998 22:21:05 -0400 (EDT)
To: tacgps@tapr.org

Message-ID: <Pine.SOL.3.96.980506221841.25142B-100000@arctic>
Rendered body type: text/plain

I still have a few GPS-20's left. If anyone wants them for $119 each
including shipping and handling...

bob bruninga
115 old farm ct
glen burnie, md 21060

20. Re: [TACGPS:1453] GPS-20's $119

From: master@cubemail.com
Date: Tue, 05 May 1998 19:55:34 -0700
To: tacgps@tapr.org
Message-ID: <354FD126.73F9@cubemail.com>
Rendered body type: text/plain

Bob Bruninga wrote:
>
> I still have a few GPS-20's left. If anyone wants them for $119 each
> including shipping and handling...
>
> bob bruninga
> 115 old farm ct
> glen burnie, md 21060
  Please e-mail master@cubemail.com

I want one of these units. ASAP

21. Re: [TACGPS:1454] Re: GPS-20's $119

From: Bob Bruninga <bruninga@nadn.navy.mil>
Date: Thu, 7 May 1998 09:20:06 -0400 (EDT)
To: tacgps@tapr.org
Message-ID: <Pine.SOL.3.96.980507091927.27005B-100000@arctic>
Rendered body type: text/plain

OK, ill ship it priority mail as soon as I get your check....

On Wed, 6 May 1998 master@cubemail.com wrote:

> Bob Bruninga wrote:
> >
> > I still have a few GPS-20's left. If anyone wants them for $119 each
> > including shipping and handling...
> >
> > bob bruninga
> > 115 old farm ct
> > glen burnie, md 21060
>   Please e-mail master@cubemail.com
>
>
> I want one of these units. ASAP
>
>

APRSdos REPLY/COMMENT:

Reply mail addr: wb4apr@amsat.org
US mail address: 115 old Farm Ct, Glen Burnie, MD 21060
See DAYTON97 HISTORY: http://web.usna.navy.mil/~bruninga/dayton.html
See Maryland APRS LIVE: http://web.usna.navy.mil/~bruninga/aprs.html
See GPS on ANY radio: http://www.tapr.org/tapr/html/mic-e.html

22. ONCORE VP problems

From: Garren Davis <g_davis@qlc.com>
Date: Thu, 7 May 1998 08:26:46 -0700
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Cc: Garren Davis <g_davis@qlc.com>
Message-ID: <8357B2D4F4C1D111B8E9006097D61018031489@ntmail.qlc.com>
Rendered body type: text/plain

I just got an ONCORE VP from TAPR and have a few questions about its
operation. I connected it to the computer and started the TAC32 software.
It came up fine and found the satellites. Then I started playing with the
epoch delay. Is the last three digits of the big display supposed to show
the delay? They don't change. The Bottom right of the program shows the
configuration of the ONCORE. It says there is DGPS but no T-RAIM. I
thought all ONCORES from TAPR were supposed to have T-RAIM. Also

when I look at the View Receiver ID Message it shows that I have option B.
I thought they was supposed to have option A or I in order to have the 1PPS.

What is option B? Below is the model and rev of the ONCORE. Can someone
tell me if I am doing something wrong?
Thanks
Garren Davis
g_davis@qlc.com

SFTW P/N #98-P36830P
SFTW ver # 10
SFTW Rev # 0
SFTW Date 24 SEP 1997
Model B8221B1116
HDWR P/N #
Serial # SSG0265861
Manufacture Date 8B10
Option List B

23. Re: [TACGPS:1456] ONCORE VP problems

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Thu, 07 May 1998 12:48:30 -0400
To: tacgps@tapr.org, g_davis@qlc.com
Cc: Greg Jones <wd5ivd@tapr.org>
Message-ID: <3551E5DE.F181F619@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Garren Davis wrote:
>
> I just got an ONCORE VP from TAPR and have a few questions about its
> operation. I connected it to the computer and started the TAC32 software.
> It came up fine and found the satellites. Then I started playing with the
> epoch delay. Is the last three digits of the big display supposed to show
> the delay? They don't change. The Bottom right of the program shows the
> configuration of the ONCORE. It says there is DGPS but no T-RAIM. I
> thought all ONCORES from TAPR were supposed to have T-RAIM. Also
> when I look at the View Receiver ID Message it shows that I have option B.
> I thought they was supposed to have option A or I in order to have the 1PPS.
>
> What is option B? Below is the model and rev of the ONCORE. Can someone
> tell me if I am doing something wrong?
> Thanks
> Garren Davis
> g_davis@qlc.com
>
> SFTW P/N #98-P36830P
> SFTW ver # 10
> SFTW Rev # 0
> SFTW Date 24 SEP 1997
> Model B8221B1116
> HDWR P/N #
> Serial # SSG0265861
> Manufacture Date 8B10
> Option List B

Hmmmmm ... looks like there may be a problem here.

First, regarding Options A/I: In the older (pre-RAIM) ONCOREs, Option
A referred to the firmware that enabled the hardware 1PPS output onto
the 10-pin header (Pin 6). Then (I think it was at firmware releases
beginning 8.x) the 1PPS capabilities were integrated with TRAIM, and
Option A became Option I = 1PPS+TRAIM.

I don't have all my notes here, but as I recall Option C enables full
code and carrier phase output in the @@Bg/@@Eg messsage, and Option B
enables only the code phase (i.e. a subset of C).

Perhaps Greg can amplify on this, but I believe that TAPR recently
updated their order for ONCOREs and I thought that the decision was
that TAPR would make available the newest, fully optioned version
of the ONCORE, the B8221Z1116 (with the carrier phase and 1 PPS
enabled, with the right-angle MCX antenna connector, and with the
onboard BBRAM battery).

The option list in your ID dump above says that you got a model number
B8221B1116 without the timing/TRAIM option. The Z vs. B in the 6th
character of the Motorola model number (as I understand their latest
perturbation on their model numbering scheme) is exactly equivalent to
the A/I option being present vs missing.

It looks to me like something is wrong, and that somehow you got
the wrong unit. All the TAC activities requires a receiver with a
hardware 1PPS output -- i.e. with either option A or I.

73, Tom

24. DGPS Reference Station

From: "Pete Prossen" <prossen@znet.com>
Date: Thu, 7 May 1998 22:09:11 -0700
To: <tacgps@tapr.org>
Message-ID: <199805080514.WAA13982@sd.znet.com>
Rendered body type: text/plain

I hope I have the correct SIG for the DGPS reference station. If not,
would someone please correct me?

I have the station running, and as verified by a view with hyperterminal,
it is producing RTCM data.

Also viewed the data coming from the TNC output of my rover station and it
looks the same. I've connected it to a Garmin GPS III to do some testing.

But the Garmin isn't happy with the data. It complains that the "RTCM data
has failed".

All of the obvious things (wiring connections, baud rate, etc) have been
eliminated. The pathing headers are suppressed so only the data is
presented to the Garmin.

The Garmin manual suggests that RTCM be derived from their own beacon
receiver, and that use of other sources may provide less than satisfactory
service. They also imply that there is some "tuning" that takes place
between the GPS receiver and the beacon receiver.

Would someone please suggest a next step for investigation?

Thanks

Pete Prossen

WA6ZUH

25. Re: [TACGPS:1458] DGPS Reference Station

From: David Martin <drmartin@ivie.com>
Date: Fri, 08 May 1998 00:22:19 -0600
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980508002219.008036a0@mail.enol.com>
Rendered body type: text/plain

>I have the station running, and as verified by a view with hyperterminal,
>it is producing RTCM data.
>
>But the Garmin isn't happy with the data. It complains that the "RTCM data
>has failed".
>
>Pete Prossen
>WA6ZUH
>

Pete:

I have a GPS III receiving data from the DGPS Reference Station.
It works well for me.

I started with a direct wire connection from the DGPS to my Garmin.
This allowed me to verify all the data format settings, baud rates,
update rate, and wiring.

I then added the TNC's and followed the directions to kill headers etc etc.
Everything worked as advertised.

I have noted that the Garmin GPS III has pretty short time out on DGPS data.
It complains If it does not hear pretty constant DGPS data.

I have not had time to investigate the required update rate.

drm

WA7FFM

26. Re: [TACGPS:1458] DGPS Reference Station

From: Steve Sampson <ssampson@access.usa-site.net>
Date: Fri, 8 May 1998 05:15:51 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199805081015.FAA16038@access.usa-site.net>
Rendered body type: text/plain

> All of the obvious things (wiring connections, baud rate, etc) have been
> eliminated. The pathing headers are suppressed so only the data is
> presented to the Garmin.

So nothing but RTCM data is coming out of the TNC? What kind of TNC?

> The Garmin manual suggests that RTCM be derived from their own beacon
> receiver, and that use of other sources may provide less than satisfactory
> service.

So to hell with the standards then? :-)

27. Re: [TACGPS:1458] DGPS Reference Station

From: "Steven R. Bible" <srbible@gate.net>
Date: Fri, 08 May 1998 14:56:37 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980508145637.009bbe40@pop.gate.net>
Rendered body type: text/plain

At 12:16 AM 5/8/98 -0500, you wrote:
>I hope I have the correct SIG for the DGPS reference station. If not,
>would someone please correct me?

You have the right list.

>I have the station running, and as verified by a view with hyperterminal,
>it is producing RTCM data.
>
>Also viewed the data coming from the TNC output of my rover station and it
>looks the same. I've connected it to a Garmin GPS III to do some testing.
>
>But the Garmin isn't happy with the data. It complains that the "RTCM data
>has failed".

This is a problem with Garmins. It is documented in the assembly manual
that the Garmins do not like the header information that TNCs send out with
the data. For example:

```
  N7HPR>DGPS:Y~fzqwieiu....
  ^^^^^^^^^^^
   It's this header the Garmins don't like.
```

You did not mention which TNC you are using. I have the PacComm Pico
packet and I can command the header off with the ADRDISP OFF command and my
GArmin 45 is happy. For the Kantronics models, the command is MHEADER OFF.
 There is no TAC-2 command for turning off the header, and I don't know if
there are commands for other models. I would like to know so I can get the
word out. I am working on a small interface to connect between a TNC and
Garmin to filter out the header.

>All of the obvious things (wiring connections, baud rate, etc) have been
>eliminated. The pathing headers are suppressed so only the data is
>presented to the Garmin.
>
>The Garmin manual suggests that RTCM be derived from their own beacon
>receiver, and that use of other sources may provide less than satisfactory
>service. They also imply that there is some "tuning" that takes place
>between the GPS receiver and the beacon receiver.

Garmin is only protecting themselves with this statement. There are
liability and service connected reasons. Since they do not know of all
possible RTCM sources out there, the technical staff cannot help you. Thus
they limit their knowledge to their own products.

>Would someone please suggest a next step for investigation?

Hope this helps Pete. Let me know if this works for you.

- Steve
(n7hpr@tapr.org)

28. Re: [TACGPS:1461] Re: DGPS Reference Station

From: "Pete Prossen" <prossen@sd.znet.com>
Date: Fri, 8 May 1998 13:17:15 -0700
To: <tacgps@tapr.org>
Message-ID: <199805082024.NAA26836@sd.znet.com>
Rendered body type: text/plain

Thanks Steven for the reply

Summary: DGPS Reference station running properly sending RTCM packets
through KPC-3 Plus TNC in transparent mode.

Packets being received through second KPC-3 Plus with
MHEADER
OFF to suppress header and pathing info. Only the RTCM
data
appears, as verified by a look with hyperterminal (deduced
by
looking at the samples in the manual).

Bit rates set at 4800 everywhere.

Garmin GPS III insists RTCM data has failed.

My next step will be to probe the actual pins on the Garmin as data flows
to
see if there is a stopped-up wire in the cable. After that I will try to
find another
brand of GPS to try.

Got to hurry, though. Supposed to demonstrate this system to Palomar
Amateur
Radio Club Wednesday.

Incidentally, there is a guy here in San Diego County that sells
Garmin-compatible data/power cables (pigtail on the other end)
for $5.00 including shipping and handling. I'm using the $30 official
Garmin cable, but you can be sure the next one will be from him.

No reply needed, unless you have another idea to try. I'll let you know
how it winds up.

Regards

Pete Prossen

WA6ZUH

prossen@znet.com

29. Garmin Cable Was Re: DGPS Station

From: "Richard Garcia" <k4gps@bellsouth.net>
Date: Fri, 8 May 1998 17:22:09 +0000
To: tacgps@tapr.org
Message-ID: <199805082123.RAA22295@mail.mia.bellsouth.net>
Rendered body type: text/plain

Can you pass along his address. I never seem to have enough of them
and I have run out of the neat Pfrank Connectors.

> Date: Fri, 8 May 1998 15:30:24 -0500 (CDT)
> Reply-to: tacgps@tapr.org
> From: "Pete Prossen" <prossen@sd.znet.com>
> To: tacgps@tapr.org
> Subject: [TACGPS:1462] Re: DGPS Reference Station

>
> Incidentally, there is a guy here in San Diego County that sells
> Garmin-compatible data/power cables (pigtail on the other end)
> for $5.00 including shipping and handling. I'm using the $30 official
> Garmin cable, but you can be sure the next one will be from him.
>
> Regards
> Pete Prossen

> WA6ZUH

k4gps@bellsouth.net Ex: N2CZF KA2FXA
Jupiter Farms FL.
http://aprs.florida.net
http://www.radiotronics.com

30. DGPS question

From: "Charles E. Heisler K3VDB" <cheisler@cyberia.com>
Date: Fri, 08 May 1998 20:32:09 -0400
To: tacgps@tapr.org
Message-ID: <199805090135.5415500@cyberia.com>
Rendered body type: text/plain

I have a question for the group. With DGPS receivers almost
to the point of being a Plug and Play RadioShack device, why does the
DOD continue with the SA broadcast? I am sure they have a good reason.
Could someone explain?

Thanks, Charlie

31. [TACGPS:1457] Re: ONCORE VP problems

From: "Steven R. Bible" <srbible@gate.net>
Date: Fri, 08 May 1998 21:45:49 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980508214549.00932e20@pop.gate.net>
Rendered body type: text/plain

We've determined the problem, the vendor sent TAPR five B model Oncores
which we in turn were sent out to five TAPR customers. We've tracked down
who received the B models and we're exchanging them with the Z models.
TAPR regrets the inconvinence caused.

Thanks for bringing the problem to our attention!

73,
- Steve
(n7hpr@tapr.org)

32. Re: [TACGPS:1462] Re: DGPS Reference Station

From: Robert Winingham <kc5ejk@onramp.net>
Date: Fri, 8 May 1998 21:17:06 -0600
To: tacgps@tapr.org
Cc: prossen@sd.znet.com
Message-ID: <v03102800b17972e9a3f6@[206.50.201.188]>
Rendered body type: text/plain

>Summary: DGPS Reference station running properly sending RTCM packets
>through KPC-3 Plus TNC in transparent mode.
>
>Packets being received through second KPC-3 Plus with
>MHEADER OFF to suppress header and pathing info. Only the RTCM
>data appears, as verified by a look with hyperterminal

I have a KPC-3 plus and will try testing that MHEADER OFF command but
have you just connected the RTCM data from the DGPSIB
direct into the Garmins GPS input line. ??

This worked for my Garmin-45xl when I set the
Garmin port to RTCM/NMEA . The RS-232 voltages don't seem to
overload the Garmin TTL like input while I did the test.

Set the RTCM rate to 10 or 15 sec. I had to wait at least
60 seconds before I saw a -D- in the Garmin GPS bar graph.

Look at the GGA data from the GPS to see if DGPS working:

GGA NMEA output from my Garmin-45 GPS with a RTCM DGPS input:
$GPGGA,003702,3250.776,N,09645.727,W,2,04,2.6,234.4,M,-24.8,M,14,1021*7E
                                      -                        -- ----
                                   DGPS FIX   time ID

Other TNC areas to check
1. Wrong RS-232 wires (Hint: The Xmit line (RS232 or TTL) will wiggles the volt meter)

```
   The GPS power ground is also the signal ground.
2.TNC packet line LEN may be too short use zero
3.The NMEA standard needs CRLF  (return-linefeed) and the RTCM may also.

------- Testing RTCM output --------

2. A DOS program, I found on the NET from DCI, called rtcmon.exe
   that can read the RTCM format
   http://www.dgps.com/rtcmon.ZIP

Poke the function keys when the program is running and one of
them will let you change the comm port and baudrate.

This is the sample output I got from the rtcmon.exe dos program from DCI
----------------------------------------
Received Type  1 at 2268.6 sec. (Len  9)
 SV  UDRE  IODE    PRC (m)    RRC (m/s)
 17    0    155     72.28      0.052
 23    0    200     -4.56      0.234
 26    0    156     -8.98     -0.208
  9    0     80     -6.70      0.048
  3    0     53    -65.96     -0.130
----------------------------------------


There is a Win-95 program at the same URL


73




Bob - Dallas,TX ---  kc5ejk@onramp.net  or  kc5ejk@amsat.org  ---
```

33. Re: [TACGPS:1464] DGPS question

```
From: Lyle Johnson <lylej@azstarnet.com>
Date: Fri, 08 May 1998 19:51:39 -0700
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980508195139.0094de30@pop.azstarnet.com>
Rendered body type: text/plain

At 07:36 PM 5/8/98 -0500, you wrote:
>                       I have a question for the group.   With DGPS receivers almost
>  to the point of being a Plug and Play RadioShack device,  why does the
>  DOD continue with the SA broadcast?  I am sure they have a good reason.
>  Could someone explain?
>
>               Thanks, Charlie

I'm no expert, but the normal DGPS broadcasts are good to several meters,
not precision stuff.

If an "enemy" were to want to use GPS against us, they would presumably
need more precision (especially if we turned OFF the coast guard stations).
 Then, the "enemy" would need to send corrections themselves - presto, we
have a "radiator" which is presumably easy to find and eliminate.

With no need for a correction broadcast, the "enemy" could use GPS
"against" us with less chance of being detected...

or so I am told :-)

Lyle
```

34. Re: [TACGPS:1464] DGPS question

```
From: Steve Sampson <ssampson@access.usa-site.net>
Date: Fri, 8 May 1998 23:26:17 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199805090426.XAA21106@access.usa-site.net>
Rendered body type: text/plain

Having served in the military, I can assure you that there are probably
several working groups analyzing volumes of data, and receiving papers
from experts in the field.  For something at this level, I would suspect
several years just to complete the data for a final decision.
```

In software development, we say they are in the "Viewgraph Engineering Phase." (substantive documents and polished briefings). There's the trial-run brief, the pre-brief, and the real brief... :-)

> I have a question for the group. With DGPS receivers almost
> to the point of being a Plug and Play RadioShack device, why does the
> DOD continue with the SA broadcast? I am sure they have a good reason.
> Could someone explain?

35. Re: [TACGPS:1466] Re: DGPS Reference Station

From: Dave Martindale <davem@cs.ubc.ca>
Date: Fri, 8 May 1998 22:22:18 -0700
To: tacgps@tapr.org
Message-ID: <l03130300b17997d31a85@[198.162.38.159]>
Rendered body type: text/plain

>Set the RTCM rate to 10 or 15 sec. I had to wait at least
>60 seconds before I saw a -D- in the Garmin GPS bar graph.

One note: The cute "D" that appears in the Garmin signal quality bar graph seems to be on the older 8-channel units only. On my 45XL, a D appears at the bottom of each bar for satellites that are differentially corrected.

But on the 12XL, the "D" is gone - probably lack of room. You will see the fix type go from "3D" to "3D DIFF", and on the interface page you'll see "receiving" if RTCM data is coming in, but there is no way to tell whether the differential corrections apply to all satellites in view or not.

Dave

36. Re: [TACGPS:1464] DGPS question

From: "Pete Prossen" <prossen@sd.znet.com>
Date: Fri, 8 May 1998 22:12:16 -0700
To: <tacgps@tapr.org>
Message-ID: <199805090601.XAA11459@sd.znet.com>
Rendered body type: text/plain

I remember reading in P. O. B. (Point of Beginning, a land surveying magazine) almost 2 years ago that the phaseout of SA has already been scheduled. Sorry I can't remember the schedule, but I'll go through the back issues and try to find it.

I think the decision had something to do with the very similar system the Russians are busy erecting.

Pete

WA6ZUH

37. My Garmin interface problems

From: "Pete Prossen" <prossen@sd.znet.com>
Date: Fri, 8 May 1998 22:36:03 -0700
To: <tacgps@tapr.org>
Message-ID: <199805090601.XAA11463@sd.znet.com>
Rendered body type: text/plain

The good news is I got out the datascope and discovered the problem, which I will describe briefly below.

The bad news is I can't find a solution that will still produce the system results I want to achieve. I have a query into Kantronics that will hopefully point
the way.

My reference station is working fine, and will be located at a convenient spot around my QTH. I will then use averaging technique to get the rough reference position survey accomplished. Then I planned to dispatch 2 or 3 rovers to precisely known benchmarks. They will return the observed location data as corrected by the reference station. The final adjustment will be manually-made to accomplish a best fit for the rovers over the benchmarks.

The problem: When a rover delivers its NMEA location, the KPC-3+ TNC echoes the sentence right back to the Garmin that produced it. And right into the open mouth that wants nothing but RTCM. So the Garmin chokes and sends up the "RTCM DATA FAILURE" flare.

The correction process works fine if I just pull the pin on the Garmin output so no NMEA packets are produced.

I'm really fond of my GPS III, but maybe there are other receivers that filter their input strings better. Meanwhile I've asked Kantronics tech support if there is a way to suppress the echo. I would expect, with their fancy GPS interface mode, they would have considered this.

Many thanks to those who offered suggestions. And thanks for some of the interesting web sites you recommended. I'll check them out right away.

Regards

Pete

WA6ZUH

prossen@znet.com

38. Re: [TACGPS:1470] Re: DGPS question

From: Terje Mathisen <Terje.Mathisen@hda.hydro.com>
Date: Sat, 09 May 1998 09:58:19 +0200
To: tacgps@tapr.org
Message-ID: <35540C9B.4F51@hda.hydro.com>
Rendered body type: text/plain

Pete Prossen wrote:
>
> I remember reading in P. O. B. (Point of Beginning, a land surveying
> magazine) almost 2 years ago that the phaseout of SA has already been
> scheduled. Sorry I can't remember the schedule, but I'll go through the
> back issues and try to find it.
>
> I think the decision had something to do with the very similar system the
> Russians are busy erecting.

I believe that's called GLONASS, it is indeed _very_ similar to GPS.

The main functional difference is that the Russians use some extra fuel to put their SV (Satelite Vehicles) into very circular orbits.

By doing this, they don't have to correct for relativistic gravity effects, which is an issue for GPS. I.e. a GPS receiver must calculate a correction term for each SV depending upon the current altitude of the SV.

(I don't know if fuel use is the real reason, or if a more excentric orbit can give better coverage of some latitudes?)

Terje
la8nw

PS. HP have a couple of very good papers on time keeping and gps, do a search of their web site to locate them!

--
- <Terje.Mathisen@hda.hydro.com>
Using self-discipline, see http://www.eiffel.com/discipline
"almost all programming can be viewed as an exercise in caching"

39. RE: [TACGPS:1467] Re: DGPS question

From: "Alan Biddle" <APBIDDLE@att.net>
Date: Sat, 9 May 1998 12:59:02 -0000
To: <tacgps@tapr.org>
Message-ID: <000001bd7b4a$3da8a220$9845450c@system>
Rendered body type: text/plain

During the Viet Nam war, we had some Tacan (Tactical Air Navigation) stations located in North Viet Nam. They were self powered, could be turned on and off remotely, and were used to help with navigation for various users. Recall that 2 NM/hr drift rates were not unusual for the INS systems of the day. An update from a signal with an error of +/- .5 NM, or 3% of the distance from the station, whichever is greater, was still a real help.

One wonders about sneaking a few DGPS stations into a potential target area using a low tech delivery device such as a briefcase, just in case. Hide a few in attics, barns, tall building, etc, and turn them on when you need

them. Using SS techniques, they would be hard to locate.

TAPR ship any units to Iraq? <grin>

Alan
WA4SCA

40. Re: DGPS question

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Sat, 09 May 1998 15:46:45 +0100
To: tacgps@tapr.org
Message-ID: <35547A65.51FE54BA@clark.net>
Rendered body type: text/plain

Several points in this thread:

Pete Prossen wrote:
>
> I remember reading in P. O. B. (Point of Beginning, a land surveying
> magazine) almost 2 years ago that the phaseout of SA has already been
> scheduled. Sorry I can't remember the schedule, but I'll go through the
> back issues and try to find it.
>
> I think the decision had something to do with the very similar system the
> Russians are busy erecting.

The system is called GLONASS and it has been in semi-operational status for
~10 years. If there is a desire, I will give a tutorial on the similiarities
and differences from GPS.

The serious financial problems as the Soviet Union "downsized" to become Russia
are evident in GLONASS. Although both GPS and GLONASS are "declared" to be
24 satellite systems, currently GPS is 26 or 27 satellites while there are
less than 10 GLONASS still operating.

There are several dual GPS-GLONASS rcvrs, both single- and dual-frequency.
The cheapest (single-frequency, L1 only) I know of is about $2500 and can
be seen at http://www.ashtech.com/ . Ashtech has just announced their dual
frequency Z18 GPS+GLONASS surveying receiver for ~$38,000.

Then Terje Mathieson added:
> The main functional difference is that the Russians use some extra fuel
> to put their SV (Satelite Vehicles) into very circular orbits.
>
> By doing this, they don't have to correct for relativistic gravity
> effects, which is an issue for GPS. I.e. a GPS receiver must calculate a
> correction term for each SV depending upon the current altitude of the
> SV.
>
> (I don't know if fuel use is the real reason, or if a more excentric
> orbit can give better coverage of some latitudes?)

Terje, your statements are not correct. If anything the GPS satellites are
in a BETTER circular orbit, and on-orbit manuvering keeps the period "locked"
at 12 (sidereal) hours very accurately. The GLONASS satellites, while in a
good circular orbit, are not as actively steered.

Your statement about this being due to relativistic effects is wrong. The
effects of GENERAL relativity (which is where gravity enters the picture)
are corrected, to first order AT THE GPS SATELLITE. Each photon sent by GPS
is derived from the 10.23 MHz atonic standard onboard. Coming from orbit to
the ground-based observer, the photon has a small amount of energy added to
it, i.e. it is blue-shifted, i.e. it's frequency is increased. To account
for this, the atomic standards onboard the GPS satellites are intentionally
set LOW in frequency by ~1:10e12 so that the user "sees" it correct.

Both the GPS and GLONASS satellites are in VERY circular orbits, although the
small eccentricity that exists is handled by each user's receiver when it uses
the Keplerian elements broadcast by the satellite to compute the spacecraft-
to-user geometry. In the case of GPS, the Keplerians are transmitted every
30 seconds in the 1500 bit GPS message, and "fresh" Keplerians are uploaded
every few hours from the ground (In GPS-speak jargon, the serial number for
the current Keps is called the IODE, Issue of Data Ephemeris).

      -

This thread began with a "Why does DoD still invoke SA?" question.
This is a question which may have a very rational technical answer, but the

one usually given ("National Security") is a political answer.

It's soapbox time:
IMHO: Yes, SA is stupid. DGPS >>TOTALLY<< cancels SA. DGPS is trivial to
implement.

At one meeting a few years ago with a JPO (Joint Program Office) person
wearing a blue suit (I won't say his name, but you might associate
either an ancient Roman king, or else an Orange-flavored drink ;<})
we were discussing just this point. When I asked about DGPS in the context
of the Coast Guard and commercial (FM Broadcast) corrections, he made the
statement to the effect "Oh -- we know all the people sending DGPS and we
can shut them down in the case of National Emergency. We've coordinated
all the proceedures with the suppliers.".

My rejoinder was that, for at least one year, my W3IWI-13 DGPS beacon had
been transmitting perfectly legal experimental DGPS beacons from a QTH
within 10 miles of the FCC's Laurel Monitoring Station, which also had
direct coverage of downtown DC and the White House.

This discussion topic was dropped immediately!

The various high-level discussions on DGPS in the post-2004 era have been
the subject for intense discussions lately. Vice President GORE released
a statement recently that says (after you cut thru the political BS) that
the starting in 2004, the GPS satellites will carry some sort of CA code
signal on L2. The discussions on the signal structure are still on-going,
The latest GPS WORLD (May 98, Page 14) has a pretty good (although somewhat
laundered) report on this set of issues.

It really boils down to this: The DoD built GPS for their own purposes.
They didn't really anticipate tyhe TREMENDOUS non-military applications
of GPS. They have long held a policy which can be paraphrased "It's our
weapon. We control it. For the civilians it may be useful as a toy, but
its OUR toy!". The incredible growth in the non-DoD GPS industry and civilian
applications, combined with the DoD's need to reposture itself in the "Downsize
Now -- The Cold War is Over" budget era (just realize that current DoD budgets
are ~$250 billion. Less than a decade ago they were nearly twice as big)
makes this reality vs. politics "debate" be very real and very hot, with LOTS
of different players. The SA issue is one of the pawns in this game.

73, Tom

41. Re: [TACGPS:1474] Re: DGPS question

From: Terje Mathisen <Terje.Mathisen@hda.hydro.com>
Date: Sat, 09 May 1998 22:20:43 +0200
To: tacgps@tapr.org
Cc: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Message-ID: <3554BA9B.7F5B@hda.hydro.com>
Rendered body type: text/plain

Dr Thomas A Clark (W3IWI) wrote:
> Then Terje Mathieson added:
> > The main functional difference is that the Russians use some extra fuel
> > to put their SV (Satelite Vehicles) into very circular orbits.
> >
> > By doing this, they don't have to correct for relativistic gravity
> > effects, which is an issue for GPS. I.e. a GPS receiver must calculate a
> > correction term for each SV depending upon the current altitude of the
> > SV.
> >
> > (I don't know if fuel use is the real reason, or if a more excentric
> > orbit can give better coverage of some latitudes?)
>
> Terje, your statements are not correct. If anything the GPS satellites are
> in a BETTER circular orbit, and on-orbit manuvering keeps the period "locked"
> at 12 (sidereal) hours very accurately. The GLONASS satellites, while in a
> good circular orbit, are not as actively steered.
>
> Your statement about this being due to relativistic effects is wrong. The
> effects of GENERAL relativity (which is where gravity enters the picture)
> are corrected, to first order AT THE GPS SATELLITE. Each photon sent by GPS
> is derived from the 10.23 MHz atonic standard onboard. Coming from orbit to
> the ground-based observer, the photon has a small amount of energy added to
> it, i.e. it is blue-shifted, i.e. it's frequency is increased. To account
> for this, the atomic standards onboard the GPS satellites are intentionally
> set LOW in frequency by ~1:10e12 so that the user "sees" it correct.
>

> Both the GPS and GLONASS satellites are in VERY circular orbits, although the
> small eccentricity that exists is handled by each user's receiver when it uses
> the Keplerian elements broadcast by the satellite to compute the spacecraft-
> to-user geometry. In the case of GPS, the Keplerians are transmitted every
> 30 seconds in the 1500 bit GPS message, and "fresh" Keplerians are uploaded
> every few hours from the ground (In GPS-speak jargon, the serial number for
> the current Keps is called the IODE, Issue of Data Ephemeris).

My basis for making those statements were a cursory examination of HP's
very nice application note, "The Science of Timekeeping", where it is
stated on page 38:

> 2 v . Einstein□s second-order
> Doppler correction states that a clock moving at a velocity □v□ with
> respect to an inertial frame will appear to run slow when compared
> with synchronized clocks in the inertial frame by a fractional amount
> □ v 2 2 2c æ è ö ø □. This is the reason for the second and fourth terms in the
> above correction equation. For clocks in GPS orbits, the second-order
> Doppler corrections cause the clocks to run slow by 0.823 ´ 10 □10 with
> respect to clocks at the geoid. On the other hand, the purely gravita-tional
> frequency shifts cause GPS satellite clocks to run fast with
> respect to clocks at the geoid by 5.289 ´ 10 □10 . The sum of these two
> effects is 4.46 ´ 10 □10 . GPS satellite clocks are slowed by this amount
> before launch in order for the broadcast signals to be correct when
> used anywhere near the earth.
> Since the GPS orbits are not perfectly circular, the eccentricity of each
> satellite□s orbit is broadcast in its data message. The GPS receiver
> software has to calculate the additional relativistic effects due to this
> eccentricity. The magnitude of this effect can be several dozens of
> nanoseconds for GPS orbits. The eccentricities of Russia□s equivalent
> system to GPS, called GLONASS, tend to be much smaller than for
> GPS. It appears that the very small eccentricity effect in the GLONASS
> system is accounted for at the transmitters by modulation of the
> transmitted clock coefficients. GLONASS was designed so that the
> receivers can get by without having to calculate this relativistic effect.

I do know that Tom is one of the foremost experts on GPS timing, but I
will at least claim that this app note gave me reasonable grounds for
making the statement I did re. GLONASS orbits being more circular than
GPS, specifically to avoid/reduce some relativistic effects.

Terje
la8nw

--
- <Terje.Mathisen@hda.hydro.com>
Using self-discipline, see http://www.eiffel.com/discipline
"almost all programming can be viewed as an exercise in caching"

42. TAC32 Version 1.2.6 Released

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sat, 9 May 1998 17:10:20 -0400
To: <tacgps@tapr.org>, <gpsdev@tapr.org>
Message-ID: <000701bd7b8e$df7b1580$101161cf@rick.cnssys.com>
Rendered body type: text/plain

Version 1.2.6 of the TAC32 software is now available at
http://www.cnssys.com/tac32/
Information on both TAC32 and the CNS Clock are available at
http://www.cnssys.com/

Version 1.2.6, May 9, 1998   RELEASE NOTES:

Performance: Reduced CPU loading by about 10 percent.

Corrections: Corrected an error in the algorithm used to probe for serial
ports. This error caused some ports to fail to be detected and could have
caused the program to fail to initialize correctly on some platforms.

Changed the default averaging limits to 1/3 day for position and timing, 1
day for RMS averaging.

Refined the averaging algorithms to eliminate errors that occurred in
various specific conditions. This will improve position averaging in NMEA
mode and correct errors in the time accuracy estimate values.

Rick
WB2TNL

Richard M. Hambly
CNS Systems, Inc.
(410) 987-7835
http://www.cnssys.com/

43. Garmin upgrades

From: "Eric A. Cottrell" <eac@shore.net>
Date: Sat, 09 May 1998 19:36:38 -0500
To: tacgps@tapr.org
Message-ID: <3554F696.195D@shore.net>
Rendered body type: text/plain

Hello,

After a week of rain, near rain, gloomy weather, and a UPS
driver that does not follow written instructions I got
my Garmin upgrade.

I went for the full 100 dollar hardware/firmware
upgrade. They exchanged the unit and I received
a boxed 12xl with Version 4.0, manual, ref card, case,
wrist strap, and batteries. Now I got an extra
case and wrist strap.

There has been changes since 2.01:

Menus have changed with some options (old and new)
under the map screen.

The satellite display will rotate (with a N to
indicate north) the same way the map display does
(Heading, Desired Track, or North UP).

The City Point DB is useful. You can find cities
by spelling out the name. The cities appear on
the map and can be set as waypoints. You can set
what level small, medium, and large cities appear.
No coastlines or other features are displayed.
The US is pretty detailed. The other parts have
major cities. I checked out the UK and some of
the smaller cities like Derby and Sheffield are
there. Glascow and Edinburgh for Scotland though
Edinburgh showed up at a medium size city level.

Battery life is greatly improved.

MGRS is supported. Headings can be degrees or
mils. A couple of fields can be choosen by
the user from a selection. There is also icons
that can be choosen when a waypoint is displayed.

Some other stuff as well that I have not used yet.

73 Eric eac@shore.net

44. Selective SA?

From: "Alan Biddle" <APBIDDLE@att.net>
Date: Sun, 10 May 1998 01:10:30 -0000
To: "TAC-BB" <tacgps@tapr.org,>
Message-ID: <000001bd7bb0$6d45e680$b945450c@system>
Rendered body type: text/plain

Some years ago someone, probably W3IWI, remarked that SA seemed to be dialed
down on the weekend. Anybody with DGPS know whether this pattern continues?

Alan
WA4SCA

45. Re: [TACGPS:1463] Garmin Cable Was Re: DGPS Station

From: "Pete Prossen" <prossen@sd.znet.com>
Date: Sat, 9 May 1998 20:44:51 -0700
To: <tacgps@tapr.org>
Message-ID: <199805100350.UAA09171@sd.znet.com>
Rendered body type: text/plain

Now that I've seen the web page, these are the Pfranc connectors. Did you
indicate

that you've been pleased with them?

The price appears to be connector only, not cable assembly as I was
informed.

I guess I'll be back at HRO Monday to buy a high-priced Garmin cable after
all.

Here is the URL:

http://home.cdsnet.net/~purple/projects/g45contr/USA/P_CA_SanDiego.htm

Pete Prossen

WA6ZUH

46. RTCM character set

From: "Pete Prossen" <prossen@sd.znet.com>
Date: Sat, 9 May 1998 20:49:24 -0700
To: <tacgps@tapr.org>
Message-ID: <199805100350.UAA09177@sd.znet.com>
Rendered body type: text/plain

Are there any ASCII control characters in the RTCM mix? The strings
display
with occasional square boxes, so it seems like not all the characters are
in the
printable range.

Reason I ask, the only way I can keep a TNC from being derailed by the code
strings is to put it in the transparent mode. If using the conversational
mode,
it stops for a while, then starts up again, and so on.

Unfortunately, the MONITOR function is disabled in the transparent mode.

Pete

WA6ZUH

47. Re: DOES ANY ONE KNOW ?

From: "john" <cdnstainless@ica.net>
Date: Sun, 10 May 1998 01:16:29 -0400
To: <tacgps@tapr.org>
Message-ID: <199805100518.BAA25773@orbitor.ica.net>
Rendered body type: text/plain

I have a paccom TNC WITH A 12 CHANNEL GPS ENGINE HAS ANY ONE SEEN IT WORK
FROM CELL TO CELL NOT WITH THE TRUCKING RADIO'S. ? IF YOU HAVE CAN YOU TELL
ME OR GIVE ME INFO ABOUT THIS METHOD OF COMMUNICATON.

BRAD

48. Re: [TACGPS:1471] My Garmin interface problems

From: "Pete Prossen" <prossen@sd.znet.com>
Date: Sat, 9 May 1998 23:08:47 -0700
To: <tacgps@tapr.org>
Message-ID: <199805100623.XAA18252@sd.znet.com>
Rendered body type: text/plain

> The problem: When a rover delivers its NMEA location, the KPC-3+ TNC
> echoes the sentence right back to the Garmin that produced it. And right
> into the open mouth that wants nothing but RTCM. So the Garmin chokes
and
> sends up the "RTCM DATA FAILURE" flare.

The solution is so simple I'm embarrassed to bring it up. Don't know why I
didn't
see it yesterday - maybe because I waited until today to clean my glasses.

The TNC command MXMIT OFF will eliminate the echo of transmitted packet
contents during the MONITOR condition. Also had to suppress the
explanation
beacon with MBEACON OFF. The rover now works fine. I used the GPS
interface mode offered by the KPC-3+ to pace the NMEA data down from the
one-second
rate out of the Garmin.

Still haven't found a way to operate the reference station in the
conversational
mode. Something in the RTCM data string chokes the TNC from time to time.
Works well in the transparent mode, but monitor function is disabled so I
can't
receive the NMEA from the rover for calibration procedure.

Pete Prossen

WA6ZUH

49. TIC TAC TOC stuff

From: Max Wheatley <max@zl2max.gen.nz>
Date: Sun, 10 May 1998 19:27:40 +1200
To: tacgps@tapr.org
Message-ID: <355556EC.3D77A488@zl2max.gen.nz>
Rendered body type: text/plain

Hi Guys

Just another responce to the survery, what do people want form the TAC.

Well we want a frequency standard to slave a "local oscillator" to for
use in SETI work.

Thanks
--
max@zl2max.gen.nz
max.wheatley@telecom.co.nz
zl2max@zl2tcx

50. TIC/TAC/TOC in our future?

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Sun, 10 May 1998 10:35:00 -0400
To: "TAC-2 mail list" <tacgps@tapr.org>
Message-ID: <000201bd7c20$d016e140$481f5c18@john.tampabay.rr.com>
Rendered body type: text/plain

Please include my name in the growing list of Rb owners who would like to
see a TIC/TAC/TOC that would guide our proud new Rb's to the
~1:10e11 level. I hope it will materialize in the not-to-distant future.

73 John W4SF

51. Re: [TACGPS:1474] Re: DGPS question

From: Lyle Johnson <lylej@azstarnet.com>
Date: Sun, 10 May 1998 08:03:41 -0700
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980510080341.00887cd0@pop.azstarnet.com>
Rendered body type: text/plain

>...Although both GPS and GLONASS are "declared" to be
>24 satellite systems, currently GPS is 26 or 27 satellites while there are
>less than 10 GLONASS still operating.

I think there are 14 GLONASS operational at this time, there were 24 in
early 1997. A combined sensor (GG-24) presently has a 41-satellite
constellation to work from.

Lyle

52. Re: Garmin Cable RE: Pfranc

From: "Richard Garcia" <k4gps@bellsouth.net>
Date: Sun, 10 May 1998 11:39:32 +0000
To: tacgps@tapr.org
Message-ID: <199805101541.LAA24211@mail.mia.bellsouth.net>
Rendered body type: text/plain

Yes, we are all pleased with them. 4 of us at work have the GPS III,
45XL, or 12XL and we have all used the connectors. It is an
interesting way of seeing "multi-level marketing" at work.I donated
$5 each in the past and with some scrap wire you can't beat it.

I just don't have a lot of time to make the cable up. There is one
fellow out there somewhere making cables for a reasonable price but I
am not shure whom or what the web site is. I can get the Garmin cable
wholesale for $19 but it is just taking the time to make it up.

> Date: Sat, 9 May 1998 22:51:43 -0500 (CDT)
> Reply-to: tacgps@tapr.org
> From: "Pete Prossen" <prossen@sd.znet.com>
> To: tacgps@tapr.org
> Subject: [TACGPS:1479] Re: Garmin Cable Was Re: DGPS Station

> Now that I've seen the web page, these are the Pfranc connectors. Did you
> indicate
> that you've been pleased with them?
>
> The price appears to be connector only, not cable assembly as I was
> informed.
>
> I guess I'll be back at HRO Monday to buy a high-priced Garmin cable after
> all.
>
> Here is the URL:
>
> http://home.cdsnet.net/~purple/projects/g45contr/USA/P_CA_SanDiego.htm
>
> Pete Prossen
>
> WA6ZUH
>
>
>
>
k4gps@bellsouth.net Ex: N2CZF KA2FXA
Jupiter Farms FL.
http://aprs.florida.net
http://www.radiotronics.com

53. pos error chart in last publication?

From: Garwood745 <Garwood745@aol.com>
Date: Sun, 10 May 1998 12:32:39 EDT
To: tacgps@tapr.org
Message-ID: <fb90d0d.3555d6a8@aol.com>
Rendered body type: text/plain

I am unable to find last month's newsletter with a fine article that showed a
chart of
calculated position (error?). I am doing some work in a city and need to
discover the error produced by urban canyons.

gary woodward

54. Re: [TACGPS:1480] RTCM character set

From: "Steven R. Bible" <srbible@gate.net>
Date: Sun, 10 May 1998 19:04:44 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980510190444.0097f3a0@pop.gate.net>
Rendered body type: text/plain

At 10:52 PM 5/9/98 -0500, you wrote:
>Are there any ASCII control characters in the RTCM mix? The strings
>display
>with occasional square boxes, so it seems like not all the characters are
>in the
>printable range.
>
>Reason I ask, the only way I can keep a TNC from being derailed by the code
>strings is to put it in the transparent mode. If using the conversational
>mode,
>it stops for a while, then starts up again, and so on.
>
>Unfortunately, the MONITOR function is disabled in the transparent mode.

Pete, the RTCM data is sent in the 8-6 format. That means bit 7 is always
a 0 and bit 6 is always a 1. So if you look at an ASCII chart, that puts
the range of printable charaters from "@" (ASCII 40 hex) to "DEL" (ASCII 7F
hex). The DEL you will see as a box on Windows HyperTerminal. Thus, to
answer your question, there are no control characters.

Take a look at your TNC settings and make sure it doesn't do something for
the DEL character. Otherwise, everything else is a printable character.

For my Reference Station, I put my TNC in transparent mode. Tom puts his
in CONV mode. The problem with either of these modes is if the power is
lost, the TNC will reset into command mode. One way to overcome this is to
command the TNC to come up into CONV or TRANS mode on power up. Another
solution is the WA8DED PROM for TNC-1 or TNC-2's. It's always in CONV mode
until commanded.

As to monitoring while in TRANS mode, you should be able to do this. But
for my Reference Station I don't worry about monitoring. For my remote
stations, I put my TNC in CONV mode.

 - Steve
 (n7hpr@tapr.org)

55. Help!

From: K4ITV <K4ITV@aol.com>
Date: Sun, 10 May 1998 20:37:04 EDT
To: tacgps@tapr.org
Message-ID: <9125403.35564831@aol.com>
Rendered body type: text/plain

After using a GPS-30-PC for 6 or 7 months as an APRS tracker, it has suddenly
up and died. The fuse is o.k. so it is getting power but is not putting out
any data. I surely hate to cut it open and wonder if anyone has any
suggestions other than junk box?

Thanks, de Charlie K4ITV

56. Re: [TACGPS:1488] Re: RTCM character set

From: Luca Bertagnolio <berta@micronet.it>
Date: Mon, 11 May 1998 07:38:05 +0200
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980511073805.01ae06a0@micronet.it>
Rendered body type: text/plain

Hello list,

At 18.07 10/05/98 -0500, Steven R. Bible wrote:
>For my Reference Station, I put my TNC in transparent mode. Tom puts his
>in CONV mode. The problem with either of these modes is if the power is
>lost, the TNC will reset into command mode. One way to overcome this is to
>command the TNC to come up into CONV or TRANS mode on power up. Another
>solution is the WA8DED PROM for TNC-1 or TNC-2's. It's always in CONV mode
>until commanded.

in my first tests since I received the DGPSIB, I found out I am lucky to
have a PacComm TNC with the firmware that supports both the ADRDISP command
(useful on the rover side) and the UIMODE command, for the base. UIMODE,
as written in the quick ref sheet, "causes immediate entry into CONMODE at
power up". Needless to say, one can choose between CONV or TRANS at his
own will, without being afraid of getting back to command mode if the power
fails.

Note also that the PacComm firmware runs fine in a standard TNC, and has
full support of APRS for those who are interested. Gwynn Ready W1BEL used
also to ship tiny GPS active antennas made for Trimble, very similar to the
ones available from Lowe in the UK.

Please note that I am not affiliated with PacComm in any way, just a
satisfied customer! :-)

Links to the above mentioned products:

PacComm: http://www.paccomm.com
Lowe: http://www.lowe.co.uk

73 de Luca IK2OVV
Milan, Italy

57. MAX232 info request

From: "Charles E. Heisler K3VDB" <cheisler@cyberia.com>
Date: Mon, 11 May 1998 10:09:03 -0400
To: tacgps@tapr.org
Message-ID: <199805111513.7183600@cyberia.com>
Rendered body type: text/plain

Could some one tell me if the Maxim MAX232CPE-ND (IC)
   is a direct replacement for the MAX232N.

                        Thanks; Charlie K3VDB

58. Re: [TACGPS:1491] MAX232 info request

From: Glenn Little <glittle@awod.com>
Date: Mon, 11 May 1998 10:26:18 -0400
To: tacgps@tapr.org
Message-ID: <35570A89.6EFC8D03@awod.com>
Rendered body type: text/plain

Charles E. Heisler K3VDB wrote:
>
>   Could some one tell me if the Maxim MAX232CPE-ND (IC)
                                                ^^^
                           C = 0 to 70 degree C^^^
                       P = plastic Dual in Line ^^
                       E = number of pins (16)   ^
The ND is i DigiKey designation for no discount

>   is a direct replacement for the MAX232N.
This does not follow the Maxim scheme. Is it another vendor part?
Usually the N indicates a dual in line package plastic case.
>
>   Thanks; Charlie K3VDB

59. Re: [TACGPS:1480] RTCM character set

From: Gary Thurmond <thga@mbari.org>
Date: Mon, 11 May 1998 11:57:50 -0700
To: tacgps@tapr.org
Message-ID: <35574A2D.9FEDD379@mbari.org>
Rendered body type: text/plain

Pete Prossen wrote:

> Are there any ASCII control characters in the RTCM mix? The strings
> display
> with occasional square boxes, so it seems like not all the characters are
> in the
> printable range.
>
> Reason I ask, the only way I can keep a TNC from being derailed by the code
> strings is to put it in the transparent mode. If using the conversational
> mode,
> it stops for a while, then starts up again, and so on.
>
> Unfortunately, the MONITOR function is disabled in the transparent mode.
>
> Pete
>
> WA6ZUH

Pete,

I have been running a differential corrections packet site (466.7625 MHz) from
Mt. Toro (Monterey CA.) for our oceanographic research activities on Monterey
Bay.

One of the first problems encountered was the hex value 7C is the default
STReamswitch character for the PacComm TNC. Every time the differential
reference receiver would output 7C hex, the TNC would do a stream switch. My
fix for the problem was to set STReamswitch to $00. The reference receiver RTCM
data includes all ascii values 40 hex to 7F hex.

Gary

w6str@mbari.org

60. Re: [TACGPS:1493] Re: RTCM character set

From: Philip Vercruysse <Philip.vercruysse@ced.be>
Date: Mon, 11 May 1998 22:40:33 +0200
To: tacgps@tapr.org
Message-ID: <35576241.B66E2574@ced.be>
Rendered body type: text/plain

Can somebody tell me where I can find the RTCM format explained in detail ?
We need to know that to write some software

```
Tnx

Philip, ON1CED

Gary Thurmond wrote:

> Pete Prossen wrote:
>
> > Are there any ASCII control characters in the RTCM mix?  The strings
> > display
> > with occasional square boxes, so it seems like not all the characters are
> > in the
> > printable range.
> >
> > Reason I ask, the only way I can keep a TNC from being derailed by the code
> > strings is to put it in the transparent mode.  If using the conversational
> > mode,
> > it stops for a while, then starts up again, and so on.
> >
> > Unfortunately, the MONITOR function is disabled in the transparent mode.
> >
> > Pete
> >
> > WA6ZUH
>
> Pete,
>
> I have been running a differential corrections packet site (466.7625 MHz) from
> Mt. Toro (Monterey CA.) for our oceanographic research activities on Monterey
> Bay.
>
> One of the first problems encountered was the hex value 7C is the default
> STReamswitch character for the PacComm TNC. Every time the differential
> reference receiver would output 7C hex, the TNC would do a stream switch. My
> fix for the problem was to set STReamswitch to $00. The reference receiver RTCM
> data includes all ascii values 40 hex to 7F hex.
>
> Gary
>
> w6str@mbari.org
[Attachment: vcard.vcf; text/x-vcard; 216 bytes]
```

61. Re: [TACGPS:1492] Re: MAX232 info request

```
From: "Charles E. Heisler K3VDB" <cheisler@cyberia.com>
Date: Mon, 11 May 1998 21:33:48 -0400
To: tacgps@tapr.org
Message-ID: <199805120238.3012700@cyberia.com>
Rendered body type: text/plain
```

```
At 09:30 AM 5/11/98 -0500, you wrote:
>Charles E. Heisler K3VDB wrote:
>>
>>    Could some one tell me if the Maxim MAX232CPE-ND (IC)
>                                               ^^^
>                           C = 0 to 70 degree C^^^
>                       P = plastic Dual in Line ^^
>                       E = number of pins (16)   ^
>The ND is i DigiKey designation for no discount
>
>>    is a direct replacement for the MAX232N.

 Hi Glenn;......Thanks for your response.

>This does not follow the Maxim scheme. Is it another vendor part?
        Yes it is.  I see after looking closely what looks like a out line of
  Texas.  So I assume it is a Texas Instrument device. It is a dual in line
  package Plastic case.  It is used as the RS232 line driver in my TAC-2.
  I am looking for a replacement because I am not getting data out of
  pin 12 with good data in 13.

 -73- Charlie
```

62. Re: [TACGPS:1492] Re: MAX232 info request

```
From: Robert Winingham <kc5ejk@onramp.net>
Date: Mon, 11 May 1998 21:26:54 -0600
To: tacgps@tapr.org
Message-ID: <v03102800b17cef96bffb@[206.50.201.147]>
```

Rendered body type: text/plain

>>   Could some one tell me if the Maxim MAX232CPE-ND (IC)

This is not a direct replacement BUT ;

I Like to use the MAX233 as it does not need the four large external
Voltage PUMP Caps. Note :The IC is not a direct replacement (more legs).

The Voltage pump generates the +- 9 volts for the RS-232 from the
+5 volts power.

If you already have +_ volts then line drivers work well
and are at Radio shack :-)

73

Bob - Dallas,TX --- kc5ejk@onramp.net or kc5ejk@amsat.org ---

63. DGPSIB Problems

From: Doug Bade <doug@clecom.com>
Date: Tue, 12 May 1998 00:46:25 -0400
To: tacgps@tapr.org
Message-ID: <3.0.32.19980512004620.00829790@en.com>
Rendered body type: text/plain

I recently received my dgpsib package from tapr and have installed the
motorola oncore rcvr provided by tapr. rcvr id shows dgps and t-raim . I am
using tac 32 ver 1.2.5 software to initialize gps. It is set in mot bin
mode, on the proper port. The gps runs in nav mode perfectly. I have
aqquired my ref location.
I activated the dgps check box, and dgps paramater set box, and it resumes
time keeping mode in 0-d mode. I watch the data from the gps as interpreted
by the
tac 32 program, set for 10 second dgps output corrections.... but... no led
flash, and no data out of the dgps output jack.. the binary data stream shows
""@@ec output correction data" (from memory) not exact...as an embedded
sentence.. I am tracing data from gps to input of pic chip but nothing else
happens .. Did I miss something ? any Ideas ? I am a commercial radio tech,
so I believe all is assembled properly, but I do not know how to
troubleshoot from here.. power supply looks ok, gps runs great. both
jumpers are on board as indicated on silksceen..and instructions.. I have
remote mounted the led, but can't believe it has any effect.. Is there any
io pins on the pic for status or
troubleshooting waveforms ????   Any help would be appreciated..
                                                Tnx.. Doug Bade KB8GVQ

64. Re: [TACGPS:1495] Re: MAX232 info request

From: "Doug McKinney" <buoy@redshift.com>
Date: Mon, 11 May 1998 22:54:39 -0700
To: <tacgps@tapr.org>
Message-ID: <002501bd7d6a$936c5e00$81c6cccf@buoy.mcktech.com>
Rendered body type: text/plain

-----Original Message-----
From: Charles E. Heisler K3VDB <cheisler@cyberia.com>
To: tacgps@tapr.org <tacgps@tapr.org>
Date: Monday, May 11, 1998 6:39 PM
Subject: [TACGPS:1495] Re: MAX232 info request

>At 09:30 AM 5/11/98 -0500, you wrote:
>>Charles E. Heisler K3VDB wrote:
>>>
>>> Could some one tell me if the Maxim MAX232CPE-ND (IC)
>> ^^^
>> C = 0 to 70 degree C^^^
>> P = plastic Dual in Line ^^
>> E = number of pins (16) ^
>>The ND is i DigiKey designation for no discount
>>
>>> is a direct replacement for the MAX232N.
>
> Hi Glenn;......Thanks for your response.
>
>>This does not follow the Maxim scheme. Is it another vendor part?
>   Yes it is. I see after looking closely what looks like a out line

of
> Texas. So I assume it is a Texas Instrument device. It is a dual in line
> package Plastic case. It is used as the RS232 line driver in my TAC-2.
> I am looking for a replacement because I am not getting data out of
> pin 12 with good data in 13.
>
> -73- Charlie
>
>

Ah, yes, now I remember this problem. The max232n is the TI MAX232
replacement, but not exactly. Looking at the wiring in MAX232 and TI you
will find that the pin 2 cap is wired differently. The MAX232CPE has the
Cap + to pin 2 and cap - to+5v input, but the TI has the cap + to pin 2 and
the - to ground!!! Make the change and it should work.
73's
Doug

65. Re: [TACGPS:1497] DGPSIB Problems

From: Luca Bertagnolio <berta@micronet.it>
Date: Tue, 12 May 1998 08:22:54 +0200
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980512082254.016f3e50@micronet.it>
Rendered body type: text/plain

At 23.49 11/05/98 -0500, Doug Bade wrote:
>I activated the dgps check box, and dgps paramater set box, and it resumes
>time keeping mode in 0-d mode. I watch the data from the gps as interpreted
>by the
>tac 32 program, set for 10 second dgps output corrections.... but... no led
>flash, and no data out of the dgps output jack.. the binary data stream shows
>""@@ec output correction data" (from memory) not exact...as an embedded
>sentence.. I am tracing data from gps to input of pic chip but nothing else
>happens .. Did I miss something ? any Ideas ? I am a commercial radio tech,
>so I believe all is assembled properly, but I do not know how to
>troubleshoot from here.. power supply looks ok, gps runs great. both
>jumpers are on board as indicated on silksceen..and instructions.. I have
>remote mounted the led, but can't believe it has any effect.. Is there any
>io pins on the pic for status or
>troubleshooting waveforms ????   Any help would be appreciated..
>   Tnx.. Doug Bade KB8GVQ

possibly you are running into the very same problem I had; in the docs, at
the very end of the last page, it is written: "If that does not work,
ground pin 1 of the microcontroller momentarily. This will reset the
microcontroller and it should start working".

Worked fine with, try setting up a faster DGPS out data rate and the LED
will flash at that rate.

73 de Luca IK2OVV
Milan, Italy

66. Motorola antennas

From: "Henk Uijterwaal (RIPE-NCC)" <henk@ripe.net>
Date: Tue, 12 May 1998 14:31:30 +0200 (MET DST)
To: tacgps@tapr.org
Message-ID: <Pine.SUN.3.95.980512142309.25295H-100000@ncc.ripe.net>
Rendered body type: text/plain

I just tried to order a few "post mounting brackets" (Motorola part
#MNT62312A1) for Motorola's "hockey puck" antenna (#ANT62301A2) through
our local Motorola distributor.   The post mount bracket is on some of the
drawings of their antennas, it is basically a metal strip with a hole for
the antenna on one side and 4 holes to attach it to a pole on the other
side.

Well, it turns out that Motorola has replaced their line of antennas and
dropped all support for the old model. As far as the sales rep could see,
they didn't have any of them lying around in a corner either.

Does anybody know of a source that might have these things?

Henk

Henk Uijterwaal   Email: henk.uijterwaal@ripe.net
RIPE Network Coordination Centre   WWW: http://www.ripe.net/home/henk
Singel 258   Phone: +31.20.535-4414, Fax -4445

1016 AB Amsterdam Home: +31.20.4195305
The Netherlands Pager: +6.57626855

%DCL-E-NOCFFE, unable to locate coffee - keyboard input suspended.

67. DGPSIB Problems continued

From: Doug Bade <doug@clecom.com>
Date: Tue, 12 May 1998 13:18:55 -0400
To: tacgps@tapr.org
Message-ID: <3.0.32.19980512131831.0068d1f8@wingate>
Rendered body type: text/plain

At 01:23 AM 5/12/98 -0500, you wrote:
>At 23.49 11/05/98 -0500, Doug Bade wrote:
>>I activated the dgps check box, and dgps paramater set box, and it resumes
>>time keeping mode in 0-d mode. I watch the data from the gps as interpreted
>>by the
>>tac 32 program, set for 10 second dgps output corrections.... but... no led
>>flash, and no data out of the dgps output jack.. the binary data stream
shows
>>""@@ec output correction data" (from memory) not exact...as an embedded
>>sentence.. I am tracing data from gps to input of pic chip but nothing else
>>happens .. Did I miss something ? any Ideas ? I am a commercial radio tech,
>>so I believe all is assembled properly, but I do not know how to
>>troubleshoot from here.. power supply looks ok, gps runs great. both
>>jumpers are on board as indicated on silksceen..and instructions.. I have
>>remote mounted the led, but can't believe it has any effect.. Is there any
>>io pins on the pic for status or
>>troubleshooting waveforms ???? Any help would be appreciated..

continued, the only problem I do see is that the 20 mhz clock seems to be
generating primary wave form at 4.08 mhz+_ not 20. checked on my service
monitor spectrum analyzer and on my oscilloscope.. marked 20.00 mhz. I
tried reset as suggested by one reply, but led goes dark during ground and
goes back high upon release.
        raw data shows "@@Ce Pseudorange Correction Output Message" twice every
3 seconds as I have set it. (using tac32)
Parms are 0-d nav, all in view best geometry, gdop iono disabled, el mask 5
degrees, dgps active, 3secs, no align, static mode...8 sats locked, ref set,
min sat sig +24, and most above +32... any input would be helpful.

binary ttl data appears on pin 28 of pic, 5v on pin 20 , ground on 8+19,
clock on 9 about 4 mhz +_, not 20 mhz.. This is about all I have...

                        HELP !!!!!!   Doug Bade kb8gvq 1-800-878-6500 10 -7
                                                m-f edt...Cleveland Communications Inc

68. Re: [TACGPS:1484] TIC/TAC/TOC in our future?

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Wed, 13 May 1998 01:59:40 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980513015940.007f2100@appstate.campus.mci.net>
Rendered body type: text/plain

Here is what I am "tinkering" with--

Use a "BOT 2" board. This is a Motorola HC11 board, inexpensive ($15), see:

http://www.rdrop.com/users/marvin/botboard.htm

Add a MC145170 PLL to the prototyping area on the board.

Phase 1:

Feed the GPS 1 PPS to one of the "input capture" pins on the HC11. (Input
Capture latches a 16 bit free-running (2 Mhz) counter when the pin changes
state, then causes an interrupt.) Feed the Rube 10 Mhz into the PLL,
reference side. The divider is preset from the HC11 to say, 10,000,
yielding 1 Khz which goes to another input capture pin. The HC11 then
divides this by a another 1000 for 1 second (the reason for not dividing to
1 sec is for Phase 3 below).

The HC11 then outputs ASCII strings with the time difference between the
Rube and GPS in terms of 1/2 microsecond counts. Pump these into a file on
a PC, then look at them to see what the "mess" looks like, e.g. jitter,
trend, etc.

Phase 2: Steer the Rube

Add a (serial) DAC to the board. If 1v changes the Rube 1E-9, then 1E-12 means 1 part in 1000, so a 12b DAC should give enough resolution. The MAX5352 looks good; the MAX544 is pin compatible and 14 b, and both have serial inputs (which makes it simple to hook to the HC11).

"Play" with control schemes (software) and see if I can close-the-loop. I've been looking at second order PLLs. Holding the setting the absence of signal is also a consideration.

Phase 3: Lock an xtal to the Rube

Add a VCXO to the board (cheap xtal). Pick any freq, such as the master osc for the rig, e.g. ICOM 706, at 15 Mhz. Feed the other half of the MC145170. The preset divider is set to match the Rube-side divider (i.e 1 Khz in this example). The PLL feeds an op-amp to close the loop for the xtal.

Phase X1: Discipline the xtal from the GPS, no Rube

The Rube could be left out in which case the MC145170 merely serves as a compact (though not cheap, i.e. $8+ part), divider. The DAC then is connected to the VCXO, rather than the Rube. I think the accuracy of the VCXO will end up depending on the rate of drift due to temperature change. The board and HC11 could handle a DS1624 temperature sensor which could control a resistive heater to make a cheap oven control.

Phase X2: Phase lock a VCXO to the Rube, no GPS

This makes the HC11 overkill, the HC11 merely used to setup the counters and registers in the MC145170. (Mot has some PLL parts with "a million" pins brought out so that the counter preset count can be set in parallel, elminating the need for HC11)

Phase X3: Phase lock a rig's master osc directly

Steer the rig's master osc via temperature. "Glue" some resistors to the xtal inside the rig. The HC11 swithces power (PWM) on & off to the resistors (32 ms PWM cycle gives 16 bit resolution). Pick off some of the rig's master osc signal, and amplify it so it can drive the PLL input (1/2 v rms). The HC11 sets the PWM, i.e. heat, according to the comparison to a) Rube, or b) 1 PPS (in case one doesn't have a Rube).

Phase Y: Layout a board

I was thinking of laying out a pc board for it, mostly just to find out about the CAD stuff. It's been over 30 yrs since I laid out a board (using tape on mylar).

Considerations:

1.	Convenience: The HC11 may not be the cheapest (MC68HC811E2 runs about $14, single qty) (BOT 2 at $18 is a bargain, however), but I already have a) a few BOT2 boards, and b) C compiler et al. to make it work.

2.	Technical:

	a.	Quantization noise: With an 8 Mhz xtal, the HC11 the input capture latches 1/2 us counts. If the Garmin 30 (which I have two) has a jitter of about 1 us rms, then the 1/2 us raises the rms error to 1.25. With the ONCORE, which Tom said has something of the order of 30 nano-s rms jitter, a lot of noise is added by the 1/2 us. (However, if the micro's clock is stable, then, over a period of time/readings, the 1/2 us resolution should "average out" to increase the resolution.) External, faster counters to achieve even 10 ns, much less 1 ns, resolution would not be a trivial design.

	b.	Absence of signal detection: The BOT2 has a 232 level converter with two Rx and Tx level convertors, one pair used for the serial port and the other pair unused. Pick off the GPS -> PC RS-232 line, and via the spare Rx level convertor, select either the PC (default for program loading/debugging) or GPS (for detecting out-of-lock), i.e. the program sets a bit that changes the serial port input. Use the spare Tx level convertor to convert the 1 PPS for driving the TAC program in the PC.

Status

I just received a few MC145170P1 (from Future Active), have the 24v supply, and my Rube is due in a few weeks, so I am close to getting Phase 1 going. I've sketched out the details for the above and the BOT 2/HC11'E2 should

handle all the options above.

I would be happy to share software, schematics, and especially wild ideas
with anyone who is interested.

Don, W4DH

69. Re: [TACGPS:1493] Re: RTCM character set

From: "Pete Prossen" <prossen@znet.com>
Date: Tue, 12 May 1998 20:56:03 -0700
To: <tacgps@tapr.org>
Message-ID: <199805130407.VAA01862@sd.znet.com>
Rendered body type: text/plain

ATTN Gary W6STR

By gosh, Gary, you solved my problem. The KPC-3+ needed
exactly the same fix. Thanks so much.

Pete Prossen

WA6ZUH

> > Are there any ASCII control characters in the RTCM mix?

snip

> > only way I can keep a TNC from being derailed by the code
> > strings is to put it in the transparent mode. If using the
conversational
> > mode, it stops for a while, then starts up again, and so on.

> One of the first problems encountered was the hex value 7C is the default
> STReamswitch character for the PacComm TNC. Every time the
> differential reference receiver would output 7C hex, the TNC would do a
> stream switch. My fix for the problem was to set STReamswitch to $00.

70. DGPSIB Solved.

From: Doug Bade <doug@clecom.com>
Date: Wed, 13 May 1998 00:10:30 -0400
To: tacgps@tapr.org
Message-ID: <3.0.32.19980513001025.0082c700@en.com>
Rendered body type: text/plain

With the help of Steve Bible N7HPR, we determined that my 20mhz clock was
bad, I replaced from junk box (an old 286 motherboard :).... and all is
well, Tnx for all input I received...
                See ya'll in Dayton... 73.. Doug Bade, KB8GVQ

71. Re: TIC/TAC/TOC in our future?

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Wed, 13 May 1998 11:32:37 -0400
To: "TAC-2 mail list" <tacgps@tapr.org>
Message-ID: <000001bd7e84$5be72620$481f5c18@john.tampabay.rr.com>
Rendered body type: text/plain

Sounds interesting Don. Keeps us advised of your progress.

73 John W4SF

72. TAC32

From: Garren Davis <g_davis@qlc.com>
Date: Wed, 13 May 1998 12:32:16 -0700
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Cc: Garren Davis <g_davis@qlc.com>
Message-ID: <8357B2D4F4C1D111B8E9006097D61018031492@ntmail.qlc.com>
Rendered body type: text/plain

Hi Everyone,

I am using the TAC32 software with the ONCORE GPS.
Can someone tell me what the "Measurement Cable Delay"
parameter in the Set Timing Parameters window does. It
looks very similar to the "Antenna Cable Delay" parameter.
Also I noticed that sometimes the "Position Filter Counter"

has two numbers (xxxx/yyyy) in it. What does this indicate?

Thanks
Garren Davis
g_davis@qlc.com

73. RE: [TACGPS:1506] TAC32

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Wed, 13 May 1998 19:58:24 -0400
To: <tacgps@tapr.org>
Message-ID: <000301bd7ecb$03c2c980$101161cf@rick.cnssys.com>
Rendered body type: text/plain

Garren,

Measurement Cable Delay does the same thing as the Antenna Cable Delay, in the end. It does, however, give you access to a separate copy of the coax cable calculator (the "?" button) that allows you to define and save the parameters of your measurement cable definition separately from the definition of your antenna cable(s). This allows quick and easy changes to the measurement cable parameters without effecting the antenna cable parameters. Help should have explained this.

The dual numbers in the Position Filter Counter window is a relatively new addition to show you when the receiver falls out of 3-D lock and into 2-D lock. In that case the position averaging continues for the horizontal parameters but not for the vertical parameters. Thus the counters for horizontal and vertical get out of step. This, too, should be explained in the Help.

Rick
WB2TNL

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Garren Davis
Sent: Wednesday, May 13, 1998 3:34 PM
To: tacgps@tapr.org
Subject: [TACGPS:1506] TAC32

Hi Everyone,

I am using the TAC32 software with the ONCORE GPS.
Can someone tell me what the "Measurement Cable Delay"
parameter in the Set Timing Parameters window does. It
looks very similar to the "Antenna Cable Delay" parameter.
Also I noticed that sometimes the "Position Filter Counter"
has two numbers (xxxx/yyyy) in it. What does this indicate?

Thanks
Garren Davis
g_davis@qlc.com

74. TAC32

From: Garren Davis <g_davis@qlc.com>
Date: Thu, 14 May 1998 08:58:17 -0700
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Cc: Garren Davis <g_davis@qlc.com>
Message-ID: <8357B2D4F4C1D111B8E9006097D61018031494@ntmail.qlc.com>
Rendered body type: text/plain

Rick,

Thanks for the response. I guess I didn't really ask the question I ment to.
I understand
that the Measurement Cable Delay basically does the same thing as the
Antenna Cable
Delay but what I ment to ask was what is the Measurement Cable Delay
parameter used
for? Is it to compensate for the cable length of test equipment like Oscope
probes?

And I couldn't find the explaination for the dual numbers in the Position
Filter Counter in
any of the Help files. Was it explained in some release notes file that I
missed or am I
just not looking at the right Help file.

Thanks again
Garren

Measurement Cable Delay does the same thing as the Antenna Cable Delay, in the end. It does, however, give you access to a separate copy of the coax cable calculator (the "?" button) that allows you to define and save the parameters of your measurement cable definition separately from the definition of your antenna cable(s). This allows quick and easy changes to the measurement cable parameters without effecting the antenna cable parameters. Help should have explained this.

The dual numbers in the Position Filter Counter window is a relatively new addition to show you when the receiver falls out of 3-D lock and into 2-D lock. In that case the position averaging continues for the horizontal parameters but not for the vertical parameters. Thus the counters for horizontal and vertical get out of step. This, too, should be explained in the Help.

Rick
WB2TNL

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Garren Davis
Sent: Wednesday, May 13, 1998 3:34 PM
To: tacgps@tapr.org
Subject: [TACGPS:1506] TAC32

Hi Everyone,

I am using the TAC32 software with the ONCORE GPS.
Can someone tell me what the "Measurement Cable Delay"
parameter in the Set Timing Parameters window does. It
looks very similar to the "Antenna Cable Delay" parameter.
Also I noticed that sometimes the "Position Filter Counter"
has two numbers (xxxx/yyyy) in it. What does this indicate?

Thanks
Garren Davis
g_davis@qlc.com

75. GPS-30 Problem

From: Russ Chadwick <kb0tvj@bouldernews.infi.net>
Date: Sun, 17 May 1998 22:26:32 -0600
To: tacgps@tapr.org
Message-ID: <355FB877.CBA36FE4@bouldernews.infi.net>
Rendered body type: text/plain

Hi -

I bought one of the TAPR GPS-30 units recently and got it working. I had to resolder around the input connector as suggested by some of the posts here. In normal operation, it took longer to acquire lock than my Garmin 12XL and lost lock before the 12XL would, but it worked OK. It always had activity on the serial output line whether it was locked or not. However, it seems to have died as now there is no activity on the output serial line.

It was operating in the sun on probably the hottest day of the spring so far here in Colorado. Air temperature probably in the high 70s or low 80s. By that evening it had quit, i.e. no activity on the serial output line. All the documentation says that it should be able to operate in the sun and this was not an extremely hot day, but it seems to have failed due to the temperature. Any suggestions on what I might do to get it running again or should I just put it in the junk box. None of the documentation has any schematics or explanation of the electronics.

Russ
KB0TVJ

76. RTCM Refresh Rate

From: "Pete Prossen" <prossen@znet.com>
Date: Sun, 17 May 1998 21:31:14 -0700
To: <tacgps@tapr.org>
Message-ID: <199805180442.VAA28739@sd.znet.com>
Rendered body type: text/plain

While making preparations to calibrate my newly-constructed DGPS reference
station, it dawned on me how little bandwidth there is on a 1200-baud ham
packet channel.

My Garmin GPS III is happy in the differential mode as long as RTCM records
arrive at intervals of 12 seconds or less. At 14-second intervals, it
drops out of the diff mode briefly until the next record arrives. I would
expect this to be typical of most "differential ready" receivers.

Allowing for occasional lost packets, it would seem like the RTCM record
interval on a packet channel should be about 6 seconds for reliable
corrections by the participating rovers.

Now it takes the better part of a second to transmit the record. So the
RTCM beacon, in order to be useful, would occupy about 15% of the channel
bandwidth. Doesn't that seem excessive?

Does anyone have a different observation of RTCM record rate needed to keep
the receiver in diff mode?

Pete Prossen

WA6ZUH

prossen@znet.com

77. Re: [TACGPS:1510] RTCM Refresh Rate

From: "Richard Garcia" <k4gps@bellsouth.net>
Date: Mon, 18 May 1998 09:46:23 +0000
To: tacgps@tapr.org
Message-ID: <199805181348.JAA21645@mail.mia.bellsouth.net>
Rendered body type: text/plain

I believe Steve K4HG has reported rates of 20 seconds work well with
his Motorola PVT-6. Right now I am in a bind since all I own are
Garmin GPS units (GPS-50 and GPS-45) and they do not appear to want
to work over the air with the TNC's I own. I am waiting to either buy
another TNC or another Motorola GPS so I can start testing this baby
out.

> Date: Sun, 17 May 1998 23:47:35 -0500 (CDT)
> Reply-to: tacgps@tapr.org
> From: "Pete Prossen" <prossen@znet.com>
> To: tacgps@tapr.org
> Subject: [TACGPS:1510] RTCM Refresh Rate

> While making preparations to calibrate my newly-constructed DGPS reference
> station, it dawned on me how little bandwidth there is on a 1200-baud ham
> packet channel.
>
> My Garmin GPS III is happy in the differential mode as long as RTCM records
> arrive at intervals of 12 seconds or less. At 14-second intervals, it
> drops out of the diff mode briefly until the next record arrives. I would
> expect this to be typical of most "differential ready" receivers.
>
> Allowing for occasional lost packets, it would seem like the RTCM record
> interval on a packet channel should be about 6 seconds for reliable
> corrections by the participating rovers.
>
> Now it takes the better part of a second to transmit the record. So the
> RTCM beacon, in order to be useful, would occupy about 15% of the channel
> bandwidth. Doesn't that seem excessive?
>
> Does anyone have a different observation of RTCM record rate needed to keep
> the receiver in diff mode?
>
> Pete Prossen
>
> WA6ZUH
>
> prossen@znet.com
>
>
>
>
>

k4gps@bellsouth.net Ex: N2CZF KA2FXA
Jupiter Farms FL.
http://aprs.florida.net

http://www.radiotronics.com

78. Re: [TACGPS:1511] Re: RTCM Refresh Rate

From: Mike Young <myoung@neo.lrun.com>
Date: Mon, 18 May 1998 10:23:58 -0400
To: tacgps@tapr.org
Message-ID: <199805181424.JAA01389@tapr.org>
Rendered body type: text/plain

At 09:51 AM 5/18/98 , you wrote:
>I believe Steve K4HG has reported rates of 20 seconds work well with
>his Motorola PVT-6. Right now I am in a bind since all I own are
>Garmin GPS units (GPS-50 and GPS-45) and they do not appear to want
>to work over the air with the TNC's I own. I am waiting to either buy
>another TNC or another Motorola GPS so I can start testing this baby
>out.
>
I too am concerned about excessive refresh rates that may be required by
SOME gps receivers. Remember as DGPS signal providers we need to
address the needs of ALL gps units used in the coverage area.

Steve's PVT-6 is an OEM product that probably feeds his computer or
gps receiver directly. I've seen a few reports that indicate that the
handheld
units (Garmin) might need more frequent DGPS updates as reported by Pete
Prossen. Tom, W3IWI has been providing DGPS for some time and may
have some words of encouragement for us regarding the rate issue.

I hope to try it out on a GPS-20 (all I got for now) but dunno at this time
how
to tell if the unit is running in the DGPS mode. Handheld unit seem to have
a screen indicator that provides status. Perhaps the GPS-20 emits a text
message that would help. Need to do more research.

Thanks for the space!

Mike, WB8CXO

79. Re: RTCM Refresh Rate + KPC Stuff

From: Doug Bade <doug@clecom.com>
Date: Mon, 18 May 1998 10:55:00 -0400
To: tacgps@tapr.org
Message-ID: <3.0.32.19980518105442.0082d180@en.com>
Rendered body type: text/plain

Hi All, Just before leaving for Dayton , I was running tests at my
office with the DGPSIB, and Garmins. My GPS II and MY GPS 65, both handled
20 seconds, but much more than that would cause differential dropout.
        I am planning to use a 440 frequency, as it seems that packet rate will
totally destroy throughput on 144.39 here, especially if Digi's are included.
        I have Garmin 20's and 30's to test too, so I will pass on my data as I
can.
        On a Kantronics issue I am dealing with their commercial firmware which
is used in the kpc3+ equivalent uses a 1 meg eprom, and supports several other
protocols . The one called TUP, removes call sign info and is basically a
modified version of unproto converse mode.. It looks interchangeable with a
kpc3+ Ham version, I am investigating..... The chip supports all ax25 and a
whole lot more..... I will keep you all posted on my findings... 73 for now
                                                                Doug KB8GVQ.

At 09:27 AM 5/18/98 -0500, you wrote:
>At 09:51 AM 5/18/98 , you wrote:
>>I believe Steve K4HG has reported rates of 20 seconds work well with
>>his Motorola PVT-6. Right now I am in a bind since all I own are
>>Garmin GPS units (GPS-50 and GPS-45) and they do not appear to want
>>to work over the air with the TNC's I own. I am waiting to either buy
>>another TNC or another Motorola GPS so I can start testing this baby
>>out.
>>
>I too am concerned about excessive refresh rates that may be required by
>SOME gps receivers. Remember as DGPS signal providers we need to
>address the needs of ALL gps units used in the coverage area.
>
>Steve's PVT-6 is an OEM product that probably feeds his computer or
>gps receiver directly. I've seen a few reports that indicate that the
>handheld
>units (Garmin) might need more frequent DGPS updates as reported by Pete
>Prossen. Tom, W3IWI has been providing DGPS for some time and may
>have some words of encouragement for us regarding the rate issue.

>
>I hope to try it out on a GPS-20 (all I got for now) but dunno at this time
>how
>to tell if the unit is running in the DGPS mode. Handheld unit seem to have
>a screen indicator that provides status. Perhaps the GPS-20 emits a text
>message that would help. Need to do more research.
>
>Thanks for the space!
>
>Mike, WB8CXO
>
>
>

80. Re: [TACGPS:1512] Re: RTCM Refresh Rate

From: Bob Bruninga <bruninga@nadn.navy.mil>
Date: Mon, 18 May 1998 12:48:40 -0400 (EDT)
To: tacgps@tapr.org
Message-ID: <Pine.SOL.3.96.980518124100.6196T-100000@arctic>
Rendered body type: text/plain

In my opinion, if DGPS is worth doing, then it should be worth doing
right. Get a coordinated digital frequency in your area and transmit DGPS
data there continuously. If you want DGPS input, then put a cheap
receiver on that freq, and feed the data continuously.

For APRS, a station moving at 30 MPH and reporting his position once every
2 minutes, his position is only being reported once every mile. So having
30 foot accuracy is only good if you need to know where he was to the
nearest fraction of a second.

I doubt that at any one time, that any more than one of those 150 needs
DGPS and so it should be on an "on demand" basis. But again, is better to
just have it on full time on another channel... But stand by for the
"lawyers"! :-)

 On Mon, 18 May
1998, Mike Young wrote:

> At 09:51 AM 5/18/98 , you wrote:
> >I believe Steve K4HG has reported rates of 20 seconds work well with
> >his Motorola PVT-6. Right now I am in a bind since all I own are
> >Garmin GPS units (GPS-50 and GPS-45) and they do not appear to want
> >to work over the air with the TNC's I own. I am waiting to either buy
> >another TNC or another Motorola GPS so I can start testing this baby
> >out.
> >
> I too am concerned about excessive refresh rates that may be required by
> SOME gps receivers. Remember as DGPS signal providers we need to
> address the needs of ALL gps units used in the coverage area.
>
> Steve's PVT-6 is an OEM product that probably feeds his computer or
> gps receiver directly. I've seen a few reports that indicate that the
> handheld
> units (Garmin) might need more frequent DGPS updates as reported by Pete
> Prossen. Tom, W3IWI has been providing DGPS for some time and may
> have some words of encouragement for us regarding the rate issue.
>
> I hope to try it out on a GPS-20 (all I got for now) but dunno at this time
> how
> to tell if the unit is running in the DGPS mode. Handheld unit seem to have
> a screen indicator that provides status. Perhaps the GPS-20 emits a text
> message that would help. Need to do more research.
>
> Thanks for the space!
>
> Mike, WB8CXO
>
>

APRSdos REPLY/COMMENT:

Reply mail addr: wb4apr@amsat.org
US mail address: 115 old Farm Ct, Glen Burnie, MD 21060
See DAYTON97 HISTORY: http://web.usna.navy.mil/~bruninga/dayton.html
See Maryland APRS LIVE: http://web.usna.navy.mil/~bruninga/aprs.html
See GPS on ANY radio: http://www.tapr.org/tapr/html/mic-e.html

81. Re: [TACGPS:1513] Re: RTCM Refresh Rate + KPC Stuff

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Mon, 18 May 1998 12:19:02 -0500
To: tacgps@tapr.org
Message-ID: <v04003a0eb1861d42c642@[207.43.172.66]>
Rendered body type: text/plain

```
>       I am planning to use a 440 frequency, as it seems that packet rate
>will
>totally destroy throughput on 144.39 here, especially if Digi's are included.

Do you know for a fact ?

Sounds like we need to do some testing before you make an assumption like this.

Many felt in the late 1980's here in Texas that DX Cluster traffic being
sent every few seconds over TexNet was going to clog everything.  What we
found out when testing was that a BBS connected for 1 hour generated more
latency in the network than did the DX Cluster trasmissions every 15-30
secs.

Now we are talking about every 15-20secs in some cases for a DGPS string.
So, who plans on testing and finding out what the congestion impact is
going to be before we set off on trying to find yet another freq to do DGPS
on that requires people to have a second receiver in the car.

Cheers - Greg

-----
Greg Jones, WD5IVD                Austin, Texas
wd5ivd@tapr.org      http://www.tapr.org/~wd5ivd


Real World, The n.:
        5. Anywhere outside a university.  "Poor fellow, he's left UT
Austin and gone into the real world."
```

82. Re: [TACGPS:1514] Re: RTCM Refresh Rate

From: Steve Sampson <ssampson@access.usa-site.net>
Date: Mon, 18 May 1998 12:28:33 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199805181728.MAA26019@access.usa-site.net>
Rendered body type: text/plain

```
I never really considered it, but you are right, the DGPS is
basically worthless for use with APRS in its present form.

Maybe one of these days all the 1.2 kbps stuff will burn out :-)

Maybe if a future APRS was designed for high speed and faster
updates of all participants, then the DGPS could be overlayed
onto the frequency.  But yes, DGPS on 144.39 is ridicules.

The TEKK radios are very cheap, and are available for 9.6 kbps
and 19.2 kbps.  I think the APRS group needs to define a 70cm
DGPS coordinated frequency Continental (World) wide for the
purpose of high power, high speed data broadcasts. 1 Hz rate
preferable.

The TEKK lacks any audio circuits.  Maybe a good TAPR Kit
would be to make a board that the DGPS plus into (another
stack, ha) that contains the audio circuits to modulate these
do-dads at 4800 AFSK.  With no TNC.

What we want to replace is the high-cost commercial FM
subcarriers.

Steve

>
> In my opinion, if DGPS is worth doing, then it should be worth doing
> right.  Get a coordinated digital frequency in your area and transmit DGPS
> data there continuously.  If you want DGPS input, then put a cheap
> receiver on that freq, and feed the data continuously.
```

83. RE: [TACGPS:1508] TAC32

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Mon, 18 May 1998 16:49:26 -0400
To: <tacgps@tapr.org>
Message-ID: <001301bd829e$71c19e80$101161cf@rick.cnssys.com>
Rendered body type: text/plain

Garren,

Because the time and position solutions for GPS are actually correct only
for the phase center of the antenna (not the receiver), a method was needed
to adjust the timing solution so that the 1PPS signal would be accurate at
the "device under test" (DUT). Motorola recognized the problem and provided
the raw material to accomplish the corrections in a set of timing offset
commands for the Oncore VP and UT+. They also provided a means of steering
the corrected 1PPS signal anywhere within the UTC second, but that is
another story.

TAC32 took a cue from ShowTime and provided a user friendly means of
identifying and quantifying the components of the antenna-to-DUT delays,
going a step further by providing coax cable delay calculators (the "?"
buttons). These and the receiver gate delays are there to help you identify
the components of the overall delay so that this delay can be compensated
for by TAC32 commands to the GPS receiver. After all, you can't get, say,
<50 nsec accuracy against UTC if your total cable delay (antenna cable +
measurement cable) is 100 nsec unless the cable delay is removed by biasing
the 1PPS signal in the receiver to -100nsec (100 nsec early).

Does this help, Garren? I guess I'll have to update the help files for the
next update.

Rick
WB2TNL

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Garren Davis
Sent: Thursday, May 14, 1998 12:01 PM
To: tacgps@tapr.org
Subject: [TACGPS:1508] TAC32

Rick,

Thanks for the response. I guess I didn't really ask the question I ment to.
I understand that the Measurement Cable Delay basically does the same thing
as the
Antenna Cable Delay but what I ment to ask was what is the Measurement Cable
Delay
parameter used for? Is it to compensate for the cable length of test
equipment like Oscope
probes?

And I couldn't find the explaination for the dual numbers in the Position
Filter Counter in any of the Help files. Was it explained in some release
notes file that I
missed or am I just not looking at the right Help file.

Thanks again
Garren

84. IMHO on Refresh rate

From: "Doug McKinney" <buoy@redshift.com>
Date: Mon, 18 May 1998 14:46:26 -0700
To: "TACGPS" <tacgps@tapr.org>
Message-ID: <004801bd82a6$6d7f8e60$78c6cccf@buoy.mcktech.com>
Rendered body type: text/plain

In the Monterey Bay Area, California, the Monterey Bay Aquarium Research Institute (MBARI) transmits
DGPS on 466.7625 MHz. They transmit it at 1200 baud packet and every 5 seconds for every one to use.
All you needed was a scanner and a TNC. I have built several systems for the Naval Postgraduate School,
 which took advantage of the free service. Applications include, Autonomous Underwater Vehicle AUV,
Remotely Piloted Vehicle (RPV) and Man Packs for area field studies, to name a few. I have also helped
other users with using the DGPS source for locating such things as under water pipe output lets in the
Monterey Bay. The 5 second update rate, provides the optimum in performance and the 1200 baud TNC
provides a cheap interface for a scanner.
    There are going to be many discussions on how to use the DGPS data. IMHO, the best public service
opportunity is to have a dedicated 5 second update system, which beings the HAMs, educational
institutions and other public resources (Red Cross, ARES, RACES etc..) into recognizing the value of HAM
 Radio operators in their community. There are many uses, outside of APRS, that a DGPS beacon can be
used for; as mentioned above. So, take a big picture look, for your area, where other users can benefit
 from a HAM Radio service.
73's

Doug

85. Re: [TACGPS:1509] GPS-30 Problem

From: "Doug McKinney" <buoy@redshift.com>
Date: Mon, 18 May 1998 14:55:36 -0700
To: <tacgps@tapr.org>
Message-ID: <006501bd82a7$c5726600$78c6cccf@buoy.mcktech.com>
Rendered body type: text/plain

-----Original Message-----
From: Russ Chadwick <kb0tvj@bouldernews.infi.net>
To: tacgps@tapr.org <tacgps@tapr.org>
Date: Sunday, May 17, 1998 9:37 PM
Subject: [TACGPS:1509] GPS-30 Problem

>Hi -
>
>I bought one of the TAPR GPS-30 units recently and got it working. I
>had to resolder around the input connector as suggested by some of the
>posts here. In normal operation, it took longer to acquire lock than my
>Garmin 12XL and lost lock before the 12XL would, but it worked OK. It
>always had activity on the serial output line whether it was locked or
>not. However, it seems to have died as now there is no activity on the
>output serial line.
>
>It was operating in the sun on probably the hottest day of the spring so
>far here in Colorado. Air temperature probably in the high 70s or low
>80s. By that evening it had quit, i.e. no activity on the serial output
>line. All the documentation says that it should be able to operate in
>the sun and this was not an extremely hot day, but it seems to have
>failed due to the temperature. Any suggestions on what I might do to
>get it running again or should I just put it in the junk box. None of
>the documentation has any schematics or explanation of the electronics.
>
>Russ
>KB0TVJ
>

The GPS30 is designed to work under all outdoor conditions. Failure reason
is unknown, but good old trouble shooting, starting at the antenna and
connections and touching the unit to see if it is warm and many other simple
checks can usually find something to correct or suspect. The reason the
GPS30 working slower than the 12XL is the processing power. The GPS30 is a
2 channel sequential processing receiver, while the 12XL is a 12, parallel
channel processing receiver, therefore, mucho faster processing!
Good Luck
73's
Doug

86. Re: [TACGPS:1513] Re: RTCM Refresh Rate + KPC Stuff

From: "Steven R. Bible" <srbible@gate.net>
Date: Mon, 18 May 1998 18:40:20 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980518184020.00a8e2f0@pop.gate.net>
Rendered body type: text/plain

At 10:06 AM 5/18/98 -0500, you wrote:
>   Hi All, Just before leaving for Dayton , I was running tests at my
>office with the DGPSIB, and Garmins. My GPS II and MY GPS 65, both handled
>20 seconds, but much more than that would cause differential dropout.
>   I am planning to use a 440 frequency, as it seems that packet rate will
>totally destroy throughput on 144.39 here, especially if Digi's are included.
>   I have Garmin 20's and 30's to test too, so I will pass on my data as I
>can.
>   On a Kantronics issue I am dealing with their commercial firmware which
>is used in the kpc3+ equivalent uses a 1 meg eprom, and supports several
other
>protocols . The one called TUP, removes call sign info and is basically a
>modified version of unproto converse mode.. It looks interchangeable with a
>kpc3+ Ham version, I am investigating..... The chip supports all ax25 and a
>whole lot more..... I will keep you all posted on my findings... 73 for now
>   Doug KB8GVQ.

Stan Huntting, KW7KW, reported that the header can be turned off on the
Kantronics TNC's. The command is MHEADER OFF. And his Garmins will work.

Rich, what kind of TNC's are you using?

- Steve
(n7hpr@tapr.org)

87. [GPSDEV:20] SA Watch 3.2 released w/DGPSIB support

From: "Steven R. Bible" <srbible@gate.net>
Date: Mon, 18 May 1998 18:41:26 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980518184126.00a8f100@pop.gate.net>
Rendered body type: text/plain

>Date: Wed, 13 May 1998 20:00:48 -0500 (CDT)
>Reply-To: gpsdev@tapr.org
>Originator: gpsdev@tapr.org
>Sender: gpsdev@tapr.org
>From: "Stan Huntting" <stan@csn.net>
>To: gpsdev@tapr.org
>Subject: SA Watch 3.2 released w/DGPSIB support
>
>SA Watch version 3.20 is now available for download from the KaWin/SA Watch
>web site, http://www.sni.net/kawin/. This is the public release so spread
>the word! :-)
>
>New features in version 3.2 of SA Watch include support for multiple, named,
>reference points; direct entry of reference point coordinates, selectable
>HDOP break points and elevation display. Version 3.2 offers full support of
>the TAPR DGPS Reference Station in both GPS receiver and DGPS reference
>station modes, including support of the high accuracy clock signal for
>system time-keeping.
>
>Thanks to all who helped with their suggestions, criticism and testing.
>
>Stan
>----------------------
>Stan Huntting, KW7KW (ex-KF0IA)
>Email: stan@sni.net Fax: 303 444 2314
>Post: 4655 Pleasant Ridge Rd., Boulder, CO 80301-1731, USA
>SA Watch/KaWin/PicturePacket home page: http://www.sni.net/kawin/

88. Re: [TACGPS:1515] Re: RTCM Refresh Rate + KPC Stuff

From: Doug Bade <doug@clecom.com>
Date: Tue, 19 May 1998 11:00:38 -0400
To: tacgps@tapr.org
Message-ID: <3.0.32.19980519110037.007aced0@en.com>
Rendered body type: text/plain

At 12:31 PM 5/18/98 -0500, you wrote:
>>   I am planning to use a 440 frequency, as it seems that packet rate
>>will totally destroy throughput on 144.39 here, especially if Digi's are
included.>
>Do you know for a fact ?
>
>Sounds like we need to do some testing before you make an assumption like
this.
...snip....
        No actually I do not know this for a fact, I am concluding this as a best guess, based on the number of units in a 150 mile radius of Cleveland, which occupy 144.39 daily. Detroit Mich., 1/2 of Ontario Canada, Cleveland, Toledo, Akron, Erie PA, Mansfield and other Parts in between. Detriot is 2 digi hops from Cleveland, So we rarely use more than 2 Digi's unless needed. Tropo- Ducting brings Detroit in directly, without Digi's.. At the present I am hearing traffic from close to 300 miles via digi's, not including HF traffic being rebroadcast locally. This happens almost daily during March through September,it is a real issue....According to a bulletin I just saw on 144.39, Ontario is indicating 20 mobile trackers running daily, and growing..., not including 5 or 6 in Cleveland alone..let alone Detroit which is a HUB of APRS activity....
        My assumption will be tested, however, before I abandon 144.39 for DGPS.

        My current tests so far on kpc3 do not allow Garmin to work, MHeader OFF not withstanding, Maybe the mode of the TNC changes this, if anyone has addtl input it would be helpful..

        The other point reference 20 sec DGPS beaconing is that if the Majority of the APRS users in a given area, have no need for DGPS, then I do not agree that my Beacon is necessarily appropriate, just because "I " want to do it.

        We have installed Trace/Call swapping firmware in the 3 Cleveland area

digi's to reduce the volume of un-necessary packets, which has helped the
echo clutter drastically. I will do my best with traffic loading
studies,under temporary test conditions, before I make a final decision, on
144.39.....

However UHF is a band I can (emphasize I) transmit over the largest area
without Digi's to reduce the echo effect... at My commercial site...
        I emphasize it is not for every area, just seems like Cleveland may need
it as a solution... The Great Lakes make very interesting propagation, good
or bad.... I have seen K.C. Mo. on 3 hops from Chicago to Grand Rapids to
My Sandusky area Digi, at my house...

        I will keep you all posted, as it seems like our congestion problems here
may be some of the worst I have heard...If anyone has any packet traffic
analysis software, or a source, for Win95, please let me know.. TNX..73.. Doug

>Now we are talking about every 15-20secs in some cases for a DGPS string.
>So, who plans on testing and finding out what the congestion impact is
>going to be before we set off on trying to find yet another freq to do DGPS
>on that requires people to have a second receiver in the car.

---

89. Re: [TACGPS:1522] Re: RTCM on UHF

From: "Richard Garcia" <k4gps@bellsouth.net>
Date: Tue, 19 May 1998 18:07:47 +0000
To: tacgps@tapr.org
Message-ID: <199805192209.SAA06538@mail.mia.bellsouth.net>
Rendered body type: text/plain

My 2 cents here. I agree that a high speed UHF frequency from a well
placed beacon using a lot of power would work well but it is
not simple. Not too many people have commercial sites where they can
just go and put a radio on. I am in the business and am lucky to be
allowed one antenna at 180ft. Many other hams have problems now with
the big changes in the industry and commercial sites being bought up
by big national companies. In the past 2 months I know of 3 radio
techs/hams that have lost their sites due to corporate takeovers just
in this area. The national companies see $$$ and don't care about
local PR so hams are kicked off for paying customers that pay an
average of $2 a foot each month. The averge height is 200ft or just
under and in these flatlands that will get you about 25 miles with
35w.

2nd point is the additional antenna, radio and probably TNC.
Currently with my dual band ham, 800 Mhz, 30 Mhz and cellular
antennas on my truck I do not wish to add another hole to the roof of
my truck. I am lucky and most people can get away with that on a
large truck but how many people with sedans want the average
cellular, dual band, and UHF DGPS antenna placed on a sedan.

If you have the room and have a good site great. But let's be real
here, some parts of the country have hard enough time geting
clubs/people interested in spending money on a digi. Try talking them
into another radio, TNC, antenna, hardline at an already crowded
location. Free sites are hard to come by, last thing I would want to
do is remind a money hungry company that they have freeloaders on
their tower. Out of site, out of mind and we are happy happy happy.

If you NEED DGPS and don't have the luxury of UHF I think groups
should test, it and see if 20sec packets are acceptable. If you have
the ability to go UHF and the users agree on the aditional equipment
then go for it. I just don't want RTCM beacons to get a bad name and
sound like they will ruin a network guaranteed. Do what you can and
live with it, you can always improve on the system as time goes on.

> Date: Tue, 19 May 1998 10:12:28 -0500 (CDT)
> Reply-to: tacgps@tapr.org
> From: Doug Bade <doug@clecom.com>
> To: tacgps@tapr.org
> Subject: [TACGPS:1522] Re: RTCM Refresh Rate + KPC Stuff

SNIP>>
> However UHF is a band I can (emphasize I) transmit over the largest area
> without Digi's to reduce the echo effect... at My commercial site...
>   I emphasize it is not for every area, just seems like Cleveland may need
> it as a solution... The Great Lakes make very interesting propagation, good

> or bad.... I have seen K.C. Mo. on 3 hops from Chicago to Grand Rapids to
> My Sandusky area Digi, at my house...
>
k4gps@bellsouth.net Ex: N2CZF KA2FXA
Jupiter Farms FL.
http://aprs.florida.net
http://www.radiotronics.com

90. Re : TAC32

From: Ron Catmur <ronc@bigpond.com>
Date: Wed, 20 May 1998 19:33:29 +0930
To: tacgps@tapr.org
Message-ID: <3562AA71.2F9@bigpond.com>
Rendered body type: text/plain

I recently pulled down the TAC32 evaluation file, and it was soon up and running.

I noticed three things were out of kilter (Two minor, one major).

1). Satellite presentation on the elev/azi map did not show any green satellites.....only blue and grey. (The unit was working O.K.)

2). The elevation mask facility did not operate...I could not change the setting.

3). When moving a 'help' box on the display, the seconds were interrupted, a time error clocked up, and the averaging process was zeroed. The system then carried on normally.

My set-up was using a GPS-20.

Has anyone else noticed these peculiaraties?

Ron VK5FY

91. DGPS Remote TNC list

From: Robert Winingham <kc5ejk@onramp.net>
Date: Wed, 20 May 1998 21:43:43 -0600
To: tacgps@tapr.org
Message-ID: <v03102801b1863c954a9f@[206.50.203.18]>
Rendered body type: text/plain

TNC Settings to fix the Garmin GPS Packet address/path problem:

TNC	Setting	
Pico Packet	ADRDISP OFF	from DGSP manual
TAC-2	none know	
Kantronics models		
KPC-3 Plus	MHEADER OFF	from Steven Bible
KPC-3 original	none know	
KPC-3 new 8.2 vers	???	

This setting will remove the call sign and path header from the Packet data and just output the DGPS information.

If you know of a parameter for other TNC's , please send it.

The KPC-3 and Pico Packet seem like the ones used by more APRS GPS trackers.

How to tell if your Remote GPS is in DGPS mode:

Garmin GPS:
Dave Martindale reports,
The cute "D" that appears in the Garmin 45/45xl signal quality bar graph are not thee for the Garmin 12X, but the FIX type will go from "3D" to "3D DIFF

OR

Monitor the GPS NMEA output $GPGGA parameter.
$GPGGA,003702,3250.776,N,09645.727,W,2,04,2.6,234.4,M,-24.8,M,14,1021*7E
- -- ----

DGPS FIX time ID

Bob - Dallas,TX --- kc5ejk@onramp.net or kc5ejk@amsat.org ---

92. TAC32 and Trimble Scoutmaster

From: "Ron L. Sparks" <rls@ibm.net>
Date: Wed, 20 May 1998 22:24:22 -0500
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980520222422.007ea510@pop5.ibm.net>
Rendered body type: text/plain

Does anyone know if a Trimble Scoutmaster can be put into the 1pps mode necessary to work with TAC32 ? If so how?

Thanks in advance,
Ron

93. RTCM On Demand?

From: "Pete Prossen" <prossen@znet.com>
Date: Wed, 20 May 1998 21:32:44 -0700
To: "Tapr GPS list server" <tacgps@tapr.org>
Message-ID: <199805210440.VAA06992@sd.znet.com>
Rendered body type: text/plain

Thanks to the responses to my "RTCM Refresh Rate" thread, I am now aware of the diversity of rather strong opinions on this subject, and a few others.

What a great way to develop insight into a subject!

I have an idea for a compromise solution, which I will now describe in the hope that it will trigger a sequel. Any opinions, pro, con, or otherwise, will be greatly appreciated.

To begin, I believe we have established the following:

1. Differential GPS is of little or no use to most hams, but it is a lot of fun to play with for a few of us.

For example, there is one ham out here who wants to find the corners of his newly-acquired ranch, and would be quite happy with 4-meter accuracy.

2. APRS buffs don't need DGPS.

But some that I know would like it to be available for emergency use. They have portable units that they keep hot for search and rescue events, etc. And those "maybe" events could be helped by the availability of DGPS.

3. There is a lot of traffic on many packet channels, and the added load of a continuous and frequent RTCM beacon would displease the users. This especially if the beacon is rarely used.

4. As so well stated by two responses (paraphrased), "DGPS should be done right if it is done at all", and "the refresh rate should be suitable for all potential users".

Interpreted: Fast enough for the receiver with the quickest differential mode dropout.

I propose "RTCM On Demand" as a solution for user groups that have an interest. Here is how it would work:

The sponsoring group would maintain a reference station that is kept hot at all times. But the station would remain silent until a user had need for the correction.

Said user would generate a beacon to request the service. On receipt of the beacon, the station would begin transmitting the RTCM strings at a suitable refresh rate for a limited period - say one or two minutes. Continued need for the corrections would require repeats of the requesting beacon at a shorter period.

When the user's need ends, the request beacons cease and shortly thereafter the RTCM station becomes silent again.

I can think of three ways to implement this. Here they are in order of my preference:

First choice: Convince a TNC manufacturer to add the supporting feature. One way to implement it would be in a manner similar to the "Beacon Location Text" feature of the KPC-3 Plus, except the output beacon must be started by receipt of the string of the request beacon and must automatically expire after a specified period.

Since RTCM data has no identifiable header, there would have to be an alternative way to deposit the records in a buffer to be sent out on the beacon.

Another way for the TNC to cooperate would be to simply output a user-definable command string to the reference station upon receipt of the request beacon, thus starting up the station's output. The TNC would also have to issue the termination command string to the station at the end of the active period.

Second choice: Develop an improved DGPSIB with the ability to intercept and filter the text of the request beacon (are you listening Steven N7HPR?). It would also have to deal with the time out.

Third choice: Develop a little post-processor for the output of the TNC. This I could do, but the installation would be much more sanitary with choices 1 or 2. Besides, I'm still trying to build my steel-framed house with just my bare hands and a screw gun. I'd like to finish it before the next El Nino.

Well, that's about it. It seems like a good solution to me, but before I'm convinced I'd like to hear what my list-server friends think.

Regards

Pete Prossen   WA6ZUH

prossen@znet.com

94. Re: [TACGPS:1525] DGPS Remote TNC list

From: Doug Bade <doug@clecom.com>
Date: Thu, 21 May 1998 01:01:48 -0400
To: tacgps@tapr.org
Message-ID: <3.0.32.19980521010143.0082de60@en.com>
Rendered body type: text/plain

```
>TNC                  Setting
>-------------        -----------
>Pico Packet          ADRDISP OFF         from DGSP manual
>TAC-2                none know
>
>Kantronics models
>
>KPC-3 Plus           MHEADER OFF         from Steven Bible

KPC-3 ver 8.x MHeader off, converse mode works, shifts data to begining of
line
KPC-3 ver 6.x MHeard command not available
also make sure 8bitconv is off...

>KPC-3 original       none know
>KPC-3 new 8.2 vers   ???

>
>This setting will remove the call sign and path header from
>the Packet data and just output the DGPS information.
>
>If you know of a parameter for other TNC's , please send it.
>
                                DGPS Running in Cleveland Ohio on 144.38 15 sec
                                One digi in unproto path.... 73... Doug KB8GVQ
```

95. DGPSIB Operation Questions

From: Doug Bade <doug@clecom.com>
Date: Thu, 21 May 1998 01:26:26 -0400
To: tacgps@tapr.org
Message-ID: <3.0.32.19980521012618.00830620@en.com>
Rendered body type: text/plain

Hello again ;
        I have set up my DGPSIB in Cleveland on 144.39 for the time. Running Tac32
software, I have set my position after about 3 days of plotting my office.
        I have moved my beacon rate down to 2 seconds and up to 20 seconds in
DGPSIB box. I am using KPC-3 units, rx unit w ver 8.2 firmware in converse
mode.
Data is flowing to my gps's tested.. but.... Connecting my garmin 65 to the
SAME
antenna as the Motorola Oncore, using a DEM 1600-1800 splitter, the position
which tac32 reports is different than the Garmin 65 reports (both DD.MM.MMM)
also DOP and EPE both go UP in differential mode !!! ?????? any idea's???
By as much as 2 hundredths of a minute... when dgps is removed, the EPE and
DOP
both drop, and the data gets much closer to the current value as reported
by TAC32... which (maybe coincidentally) seems closer to reference point
than when dgps is running..
        Do we need to set a datum in the Motorola or something??? Off hand I do
not remeber which WGS my Garmin is set for ... speculation ?????
        I discount antenna problems as sig strength dropped only slightly (2
units) in motorola signal lingo, whatever that represents..
        Mobile use of beacon yields EPE's in the 300 foot region, in Diff. mode
while in 3d nav normal is about 100 ft.. checked within a short time...
        Could my Reference position be that poor after 3 days??? I have counter
set to 999999 in TAC32, and set it from average after 3 days..

                                        Doug Bade,   KB8GVQ

96. Re: [TACGPS:1516] Re: RTCM Refresh Rate

From: "Robert L. Smith" <bobsmith@i2020.net>
Date: Thu, 21 May 1998 06:37:06 -0400
To: tacgps@tapr.org
Message-ID: <19980521104920.AAC22507@OZZIE>
Rendered body type: text/plain

At 12:33 PM 5/18/98 -0500, you wrote:
>I never really considered it, but you are right, the DGPS is
>basically worthless for use with APRS in its present form.
>
>Maybe one of these days all the 1.2 kbps stuff will burn out :-)
>
>Maybe if a future APRS was designed for high speed and faster
>updates of all participants, then the DGPS could be overlayed
>onto the frequency. But yes, DGPS on 144.39 is ridicules.
>
>The TEKK radios are very cheap, and are available for 9.6 kbps
>and 19.2 kbps. I think the APRS group needs to define a 70cm
>DGPS coordinated frequency Continental (World) wide for the
>purpose of high power, high speed data broadcasts. 1 Hz rate
>preferable.
>
>The TEKK lacks any audio circuits.
 ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
                ^^^

Steve --

Its not clear to me what you mean by that, but it mis-represents the
Tnet-Micro radios. They provide direct audio output from the FM detector
(the best way for high speed packet because the audio does not get fouled
up by de-empahsis and other band shaping crud. The output is quite high
level (generally 2 voltes P-P or more) so you usually have to build
an input attenuator for most TNCs to get the level right. I find that
a simple L pad works fine. 4K7 in series with 1K0 is usually about right.

TNC Tx audio can be fed directly to the audio-in on the TEKK. Most TNCs
have enough adjustment range to get the deviation right.

Thus, all the NEEDED audio processing required for direct FM high-speed,
packet is there.

  73 de bob, wa4ypv

  Maybe a good TAPR Kit
>would be to make a board that the DGPS plus into (another
>stack, ha) that contains the audio circuits to modulate these
>do-dads at 4800 AFSK. With no TNC.
>
>What we want to replace is the high-cost commercial FM
>subcarriers.

>
>Steve
>
>>
>> In my opinion, if DGPS is worth doing, then it should be worth doing
>> right. Get a coordinated digital frequency in your area and transmit DGPS
>> data there continuously. If you want DGPS input, then put a cheap
>> receiver on that freq, and feed the data continuously.
>
>
---- Avoid computer viruses -- Practice safe hex --------------
 * * Specializing in small, cost effective embedded control systems * *
Robert L. (Bob) Smith   Smith Machine Works, Inc.
internet   bobsmith@i2020.net   9900 Lumlay Road
landline   804/745-1065   Richmond, Virginia 23236+1004

97. Re: [TACGPS:1530] Re: RTCM Refresh Rate

From: Steve Sampson <ssampson@access.usa-site.net>
Date: Thu, 21 May 1998 06:32:42 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199805211132.GAA23996@access.usa-site.net>
Rendered body type: text/plain

> >The TEKK lacks any audio circuits.
> ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
>   ^^^
> Its not clear to me what you mean by that, but it mis-represents the
> Tnet-Micro radios.

I mean't you can't use a microphone or speaker directly, thus low baud
rate AFSK would be difficult (4800 baud).

I was only thinking of a cheap second radio, and probably the 9600 bps
rate would be better anyway with the tekk, and a simpler rx only strip
used (Hamtronics, surplus or some such).

Steve

98. RE: [TACGPS:1526] TAC32 and Trimble Scoutmaster

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Thu, 21 May 1998 07:39:56 -0400
To: <tacgps@tapr.org>
Message-ID: <000001bd84ad$2dc166a0$101161cf@rick.cnssys.com>
Rendered body type: text/plain

Ron,

The Trimble is not supported by TAC32. This is only because I do no t have
access to one or its command specs for software development. And because
there has been no call for it until now.

Rick
WB2TNL

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Ron L. Sparks
Sent: Wednesday, May 20, 1998 11:31 PM
To: tacgps@tapr.org
Subject: [TACGPS:1526] TAC32 and Trimble Scoutmaster

Does anyone know if a Trimble Scoutmaster can be put into the 1pps mode
necessary to work with TAC32 ? If so how?

Thanks in advance,
Ron

99. AURA, HDOP, and all that stuff

From: "Alan Biddle" <APBIDDLE@att.net>
Date: Thu, 21 May 1998 14:05:49 -0000
To: "TAC-BB" <tacgps@tapr.org,>
Message-ID: <000101bd84c1$8eeea140$2345450c@system>
Rendered body type: text/plain

Hi,

Can someone recommend a good reference on the terminology surrounding GPS?
Not just the definitions, which are not hard to come by, but what they

really mean, and how they are calculated.

Alan

100. DGPSIB Questions OOPS.....

From: Doug Bade <doug@clecom.com>
Date: Thu, 21 May 1998 14:49:24 -0400
To: tacgps@tapr.org
Message-ID: <3.0.32.19980521144921.00683ca0@wingate>
Rendered body type: text/plain

I posted a previous inquiry regarding large EPE and DOP numbers from my
dgps receivers on 144.39... I had the ref. sta. set in 3d mode not 0-d
(from locating my position mode), probably has something to do with it. I
will try again and for the time being, likely my operations, not
system..... sorry for the unnecessary bandwidth... 73... Doug KB8GVQ

101. Re: [TACGPS:1453] GPS-20's $119

From: "Michael St. Laurent" <rowl@earthlink.net>
Date: Thu, 21 May 1998 15:24:50 -0700
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980521152450.0094f2c0@mail.earthlink.net>
Rendered body type: text/plain

Do you still have any left? If so are you able to take Visa?
At 09:27 PM 5/6/98 -0500, you wrote:
>I still have a few GPS-20's left. If anyone wants them for $119 each
>including shipping and handling...
>
>bob bruninga
>115 old farm ct
>glen burnie, md 21060
>
>
>
>

Michael St. Laurent
Hartwell Corporation

"Whenever you find yourself on the side of the majority
it is time to pause and reflect."
               -- Mark Twain

102. Does Garmin GPS-25 have zero-d?

From: "Michael St. Laurent" <rowl@earthlink.net>
Date: Thu, 21 May 1998 15:51:39 -0700
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980521155139.00953100@mail.earthlink.net>
Rendered body type: text/plain

Does the Garmin GPS-25 (or any other Garmin for that matter) have the
zero-d mode?

Michael St. Laurent
Hartwell Corporation

"Whenever you find yourself on the side of the majority
it is time to pause and reflect."
               -- Mark Twain

103. Re: [TACGPS:1536] Does Garmin GPS-25 have zero-d?

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Fri, 22 May 1998 03:22:00 +0100
To: tacgps@tapr.org
Message-ID: <3564EF58.2C8CF98C@clark.net>
Rendered body type: text/plain

Michael St. Laurent wrote:
>
> Does the Garmin GPS-25 (or any other Garmin for that matter) have the
> zero-d mode?

The quick answer is NO. Both the 20 and 25 have a 2-D mode.
If I presume you are asking about timing applications, the 2D vs

3D does little on the -20, but it makes a noticeable improvement
in the -25. The -20 results are in plots on my aleph ftp server,
but I haven't had the time to post the -25 results for public
view. The -25 has its own bizzare performance in both 2-D and 3-D
modes (ramps of +/- 10 MICROseconds taking ~ 1 to 2 days), but it
shows none of the gross, erratic jumps that were seen on the -20.

Sorry I haven't been as vocal as normal -- last week I was out
of town and still haven't caught up with ~500 incoming Email
messages!

73, Tom

104. Re: [TACGPS:1533] AURA, HDOP, and all that stuff

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Fri, 22 May 1998 03:50:38 +0100
To: tacgps@tapr.org
Message-ID: <3564F60E.21D5F154@clark.net>
Rendered body type: text/plain

Alan Biddle wrote:
>
> Hi,
>
> Can someone recommend a good reference on the terminology surrounding GPS?
> Not just the definitions, which are not hard to come by, but what they
> really mean, and how they are calculated.
>
> Alan

Not sure what AURA is -- never heard of it. Could you have meant
UERE which means User Estimate of Range Error. UERE is a power-of-2
indicator (values = 1,2,4,8...32 meters) included in the GPS
downlink message that gives an estimate of the range error for that
particular satellite. Usually UERE=32 when SA is turned on and is
a single digit number when SA is turned off on that particular
satellite (I believe SA is off on PRN15 and on for all the other
satellites at this time).

All the xDOPs are simply numerical multipliers that show how good/bad
the current geometry is for the extraction of selected parameters.
If the average Pseudorange (PR) error is currently 30 meters and
HDOP = 2, then the uncertainty in the horizontal position ~ 60 meters.
VDOP is similarly related to the sigma on determining heights.

Since you have satellites east, west, north and south of you, the
line of constant PR intersect in a well-defined region and HDOP is
usually in the 1.0-1.5 range. To determine heights, you only have
satellites above you (the earth is not transparent), so VDOP is
always 2-3 time than HDOP, and is often in the range 2-4.

You will also see a couple of other DOPs -- PDOP is the overall 3-D
estimate of position and PDOP = sqrt(HDOP**2 + VDOP**2). Note that
PDOP is always worse than the worse of HDOP and VDOP!

Sometimes you will see TDOP, the Time Dilution of Precision. When
you run a rcvr in "zero-D" mode, it is often the case that TDOP is
in the 0.5-1.0 range -- i.e. time is better than the PR error for
one satellite (the premise on which the timing performance of the
TAC is based!).

Finally, you will sometimes see GDOP, the General Dilution of
Precision which is GDOP = sqrt (HDOP**2 + VDOP**2 + TDOP**2).

To calculate the xDOP, you need to set up the least-squares normal
equations for the observables of interest based on the satellite/
observer geometry, and then use it's inverse on the array of PR's
to extract the parameters of interest. The xDOP parameter is
extracted from the covariance matrix formed by the normal equations.
It is therefore derived from the details of the geometry of the
observer and the satellites that actually are going into the solution.
This therefore depends on the azimuth and elevation of the satellites
you are tracking.

This was a simplistic description of the way that xDOPs are derived.
If you are REALLY interested in the details, I'll refer you to
several textbooks on the topic. My personal recommendation is that
you let your receiver calculate them for you since it has to form
the normal equations in its internal microprocessor.

73, Tom

105. Re: [TACGPS:1531] Re: RTCM Refresh Rate

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Fri, 22 May 1998 04:40:54 +0100
To: tacgps@tapr.org
Message-ID: <356501D6.826C7A1A@clark.net>
Rendered body type: text/plain

Steve Sampson wrote:
>
> > >The TEKK lacks any audio circuits.
> > ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
> >   ^^^
> > Its not clear to me what you mean by that, but it mis-represents the
> > Tnet-Micro radios.
>
> I mean't you can't use a microphone or speaker directly, thus low baud
> rate AFSK would be difficult (4800 baud).
>
> I was only thinking of a cheap second radio, and probably the 9600 bps
> rate would be better anyway with the tekk, and a simpler rx only strip
> used (Hamtronics, surplus or some such).

Because I have been otherwise occupied (business trip, Dayton, etc)
I haven't had a chance to answer this thread. But you are treading
on the edges of something I've thought a lot about!

(1) I have felt very frustrated with the amateur community's lack
of innovation on modem standards. Back in the bygone days of yore
(the early 80's) when we started thinking seriously about packet
radio, Bell 202A was the "hot" modem standard, suitable for use
on voice-grade circuits. Because there were 202A modems available,
and because it didn't take much thought, we built them into the
earliest TNCs (Vancouver, TNC-1 and then for continuity the TNC-2).
It's not that 202A was a good standard, and it certainly wasn't
engraved on any golden, holy grail -- it was a quick and dirty
expedient solution. And yet, 15 years later, our early sins still
dominate most of amateur packet radio   8<{

(2) We don't need to carry DGPS signals in AX.25 format. The RTCM
SC-104 format follows the GPS 1500-bit message lead. It takes 24
data bits, and then applies 6 bits of error correction to make a 30
bit "word". The AX.25's HDLC protocol wraps an additional layer of
error detection on top, as well as a lot of other protocol overhead.
Therefore, the use of AX.25 is inefficient. And if you apply my (1)
comments, it is REALLY an inefficient use of spectrum and channel
time 8<{

(3) The idea I have in mind (which I've discussed with Steve, Doug &
Rick over fermented malt) is that there are some SIMPLE and
EFFICIENT MO's (the TX side of a MODEM) we could use, and which could
be built into a subsequent DPGSIB (or into the PIC software).

On the receive end, I envision a scanner radio (or your HT) with
a pretty trivial DEM (the receive end of a moDEM) that could poke
into the rcvr's audio output to deliver the DGPS bits directly to
your user GPS hardware.

We have seen that direct FM modulation of a TX (and its recovery
on the RX end) works, but it involves (gawd forbid) modifying the
radio for DC coupling. For data at a baud rate of x BPS, the highest
fundamental frequency of the bit string happens when the data is an
alternating 010101010 sequence, and the frequency of that square
wave goes from (nearly) zero to x/2 Hz (i.e. 1200 BPS data extends
only to 600 Hz).

To avoid the "DC Coupling" problem, and to shift the modulation up
into the audio range, Manchester encoding is often used. The [nearly
zero to x/2 Hz] baseband spectrum is heterodyned with a square-wave
at x Hz and the resultant double-sideband spectrum extends from
(x/2) to (3x/2) Hz -- i.e. 600 to 1800 Hz for 1200 BPS data. The
MO to achieve this is really hard to do -- it consists of an exclusive
or gate (a quarter of a 50 cent 74HC86) driven by the data and the
data clock, which is then followed by a low-pass audio filter that
cuts off at ~2 kHz (a couple of R's and C's).

A pretty good Manchester DEMod could be done in a small (8-pin, $1-2)

PIC micro. The PIC would convert the incoming bits into a standard
(i.e. 4800 or 9600) bit rate that your receiver wants to see. It
would probably make use of the 6-bit overhead for error detection
(and possibly even error correction) and deliver good, clean
signals to the user GPS rcvr.

Since the DEMod PIC handles speed conversion, we could pick a
signaling rate that was more optimum -- like 1800 BPS -- and still
fit into the "audio" circuitry in the cheapest radio (hence my
scanner suggestion). Using a higher speed and omitting the AX.25
packet protocol overhead, we could easily deliver good DGPS
corrections with a ~5 second update rate.

I remind you that TAPR (and hence both the DGPS and TAC projects)
are the efforts of volunteers. If these suggestions strike a
responsive chord, PLEASE PLEASE PLEASE contact us and become a
doer! The TAPR "GPS Project Officer" is Steve Bible and he can
be reached at mailto://n7hpr@tapr.org if you want to respond
or ask questions.

      - = - = - = - = - = - = - = - = - = - = - = - = - = -

On a related topic in this thread: To those who were asked about
APRS channel overload -- I have had the W3IWI-13 DGPS beacon on
the air for a couple of years on 145.79 (now 144.39). I have settled
on a 15 second rate. During last fall's TAPR/ARRL Conference held
here the APRS channel was VERY busy, and yet the 15 second DGPS rate
was only viewed as a minor annoyance (i.e. nobody cut the coax at
the DGPS beacon site, and all the APRS folks still speak to me).
I think Steve Dimse will vouch for this.

For those who say that APRSers are not really interested in having
DGPS corrections, all I can say is that I have had a LOT of positive
responses (and very few negative ones) over the years. Even if the
users don't "need the positional accuracy", the users LOVE the fact
that when they stop at a traffic light, they display a speed of ZERO.

73, Tom

easily

106. RE: [TACGPS:1538] Re: AURA, HDOP, and all that stuff

From: "Alan Biddle" <APBIDDLE@att.net>
Date: Fri, 22 May 1998 11:40:00 -0000
To: <tacgps@tapr.org>
Message-ID: <000101bd8576$5a1fa3a0$2545450c@system>
Rendered body type: text/plain

Tom,

AURA, as computed in SA Watch, is defined as Average User Range Accuracy.
And now you know as much as I do. :) (Well, actually, you know a lot
more.)

However, the explanation of UERE and xDOP were greatly appreciated! If you
know of a good basic reference, I would appreciate it if you could pass me
that information. I have found that using a technology is enhanced if you
understand, at least in a general sense, what the factors are in determining
is output. Also, my company is switching from older forms of navigation to
GPS at a great rate.

Alan
WA4SCA

107. RTCM Refresh Rate

From: Gary Mastenbrook-G13216 <Gary_Mastenbrook-G13216@email.mot.com>
Date: Fri, 22 May 1998 8:14:00 -0500
To: tacgps@tapr.org
Message-ID: <M1919667415.002.d13x1.1.980522132134Z.CC-MAIL*/OU=XNBCC/OU=ILBA/PRMD=MOT/ADMD=MOT/C=US/@MHS>
Rendered body type: text/plain

One of the important details about setting up a differential system is
     update rate. (Very obvious from the recent threads about refresh rate.
     ;-) From an engineering perspective, the issue of what you gain for
     what you pay (position accuracy vs. update time & channel loading) is
     the real question. I've seen some notes about how the channel loading
     is getting critical but have not seen much on the results gained for
     various refresh rates from the end user's perspective. Since most

receivers have different algorithms for adding in differential
corrections, it is likely that significant differences exist between
them. To me the question is: Is any information available regarding
the position error vs. update interval? It would be nice to see a
graph showing error vs. time for each of the popular receiver types
used by this group. This would allow users setting up these types of
systems to make intelligent choices about how often to send the
correction information over the channel.

To the best of my knowledge, the position error vs. update time curve
mentioned above is not available for the Motorola Oncore receivers.
(I went next door to the GPS applications team and asked them and they
said they didn't have this information in their possession. Only one
point on the curve was known: 90 seconds after the last update is
received, the receiver adapts back to non-differential algorithm
processing and sets the output status flag appropriately.) Since this
curve would be useful to provide to their customers, the GPS
applications team offered to provide me with VP & GT+ receivers to
allow me to gather data and generate the curve for our GT+ product.
This would involve setting up and executing some simple tests which
would then allow plotting the position error vs. refresh time curves.
This I intend to do. The issue of SA and its variability vs. time
will undoubtedly influence the outcome if not accounted for, and will
likely result in additional complexity in the test setup. (Probably
need to measure SA during data collection and scale the curve
appropriately to reflect 'maximum expected position error'.)

If interested, the curve for the Oncore GT+ receiver can be made
available to this group. If someone has curves for any of the other
products available, I would be very interested in adding them to the
GT+ curve. (Plots always look better with multiple curves on them
right? 8-)

Gary N8DMT
Motorola Telematics Systems Engineering
g13216@email.mot.com

108. Re: [TACGPS:1541] RTCM Refresh Rate

From: "Steven R. Bible" <srbible@gate.net>
Date: Fri, 22 May 1998 14:40:56 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980522144056.009b3b50@pop.gate.net>
Rendered body type: text/plain

Gary and group, I have posted (some time ago) performance plots for
different update rates for various GPS receivers. They are posted at

   http://www.tapr.org/gps/dgps/

Scroll down to the PERFORMANCE section and choose the appropriate links. I
can make more, just let me know what it is you want to see. And I do have
Oncore VP data there in addition to Garmin 45 and Garmin GPS-20. I have
done testing using the GT+ and UT+, but have not posted them.

- Steve N7HPR

At 01:02 PM 5/22/98 -0500, you wrote:
>   One of the important details about setting up a differential system is
>   update rate. (Very obvious from the recent threads about refresh rate.
>   ;-) From an engineering perspective, the issue of what you gain for
>   what you pay (position accuracy vs. update time & channel loading) is
>   the real question. I've seen some notes about how the channel loading
>   is getting critical but have not seen much on the results gained for
>   various refresh rates from the end user's perspective. Since most
>   receivers have different algorithms for adding in differential
>   corrections, it is likely that significant differences exist between
>   them. To me the question is: Is any information available regarding
>   the position error vs. update interval? It would be nice to see a
>   graph showing error vs. time for each of the popular receiver types
>   used by this group. This would allow users setting up these types of
>   systems to make intelligent choices about how often to send the
>   correction information over the channel.
>
>   To the best of my knowledge, the position error vs. update time curve
>   mentioned above is not available for the Motorola Oncore receivers.
>   (I went next door to the GPS applications team and asked them and they
>   said they didn't have this information in their possession. Only one
>   point on the curve was known: 90 seconds after the last update is
>   received, the receiver adapts back to non-differential algorithm

>   processing and sets the output status flag appropriately.) Since this
>   curve would be useful to provide to their customers, the GPS
>   applications team offered to provide me with VP & GT+ receivers to
>   allow me to gather data and generate the curve for our GT+ product.
>   This would involve setting up and executing some simple tests which
>   would then allow plotting the position error vs. refresh time curves.
>   This I intend to do. The issue of SA and its variability vs. time
>   will undoubtedly influence the outcome if not accounted for, and will
>   likely result in additional complexity in the test setup. (Probably
>   need to measure SA during data collection and scale the curve
>   appropriately to reflect 'maximum expected position error'.)
>
>   If interested, the curve for the Oncore GT+ receiver can be made
>   available to this group. If someone has curves for any of the other
>   products available, I would be very interested in adding them to the
>   GT+ curve. (Plots always look better with multiple curves on them
>   right? 8-)
>
>   Gary N8DMT
>   Motorola Telematics Systems Engineering
>   g13216@email.mot.com
>
>
 - Steve
 (n7hpr@tapr.org)

109. Re: [TACGPS:1531] Re: RTCM Refresh Rate

From: "Robert L. Smith" <bobsmith@i2020.net>
Date: Fri, 22 May 1998 19:20:33 -0400
To: tacgps@tapr.org
Message-ID: <19980522233255.AAA8368@OZZIE>
Rendered body type: text/plain

At 06:36 AM 5/21/98 -0500, you wrote:
>> >The TEKK lacks any audio circuits.
>> ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
>>   ^^^
>> Its not clear to me what you mean by that, but it mis-represents the
>> Tnet-Micro radios.
>
>I mean't you can't use a microphone or speaker directly, thus low baud
>rate AFSK would be difficult (4800 baud).

This is, of course, true - thank you for the clarification.

>
>I was only thinking of a cheap second radio,

Perhaps you should take a look at the little handheld communicators that
Tekk sells. You could probably jam low speed afsk through them.

 and probably the 9600 bps
>rate would be better anyway with the tekk, and a simpler rx only strip
>used (Hamtronics, surplus or some such).

This sounds like a good strategy and 9600 would probably be good for DGPS
with all the concern about channel loading.

  73 de bob, wa4ypv

>
>Steve
>
>
---- Avoid computer viruses -- Practice safe hex --------------
 * * Specializing in small, cost effective embedded control systems * *
Robert L. (Bob) Smith   Smith Machine Works, Inc.
internet   bobsmith@i2020.net   9900 Lumlay Road
landline   804/745-1065   Richmond, Virginia 23236+1004

110. Re: [TACGPS:1541] RTCM Refresh Rate

From: Lyle Johnson <lylej@azstarnet.com>
Date: Fri, 22 May 1998 17:04:36 -0700
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980522170436.00895190@pop.azstarnet.com>
Rendered body type: text/plain

At 01:02 PM 5/22/98 -0500, you wrote:
>   One of the important details about setting up a differential system is

> update rate. (Very obvious from the recent threads about refresh rate.
> ;-) From an engineering perspective, the issue of what you gain for
> what you pay (position accuracy vs. update time & channel loading) is
> the real question.

I understand that under *current policy* SA is allowed to accelerate at a maximum rate of 1cm/sec^2.

The receivers we use at work generally have a configurable parameter that indicates hold correction data is allowed to age before the recevier drops to non-differential modes.

We also have mine-management systems running with more than 40 active users (mining trucks and shovels) on a single 1200-baud channel (yes, we go faster but some of these are old installations) and in addition to the real-time management informaiton, we send on the same single channel the differential correction informaiton, and each piece of equipment takes 5-second snapshots other gps vectors and upload them to the central computer at typically 8-minute intervals.

With this we get 2-5 meter accuracy using low-cost sensors (e.g., VP Oncore or SK-8) and no problems with channel congestion. This on a 24 hour-per-day, 7-day-per-week basis. We send out the DGPS messages every 10 to 20 seconds (configurable, depending on the client). We also use a compressed data format as RTCM, while standard, is incredibly inefficient/verbose.

We do the same with systems running at 9600 bit/sec and sending (compressed) RTK corrections every second or two as well as DGPS corrections every 10 seconds or so.

The receivers are set up to allow dropping a correction and still staying in DGPS (or RTK) mode.

Naturaly, if the SA policy changes, we may have to modify the update rate...

73,

Lyle

111. Re: [TACGPS:1544] Re: RTCM Refresh Rate

From: Steve Sampson <ssampson@access.usa-site.net>
Date: Fri, 22 May 1998 20:34:44 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199805230134.UAA01886@access.usa-site.net>
Rendered body type: text/plain

> We also use a
> compressed data format as RTCM, while standard, is incredibly
> inefficient/verbose.

Good idea, put that in the PIC based TX/RX as well :-)

112. Re: [TACGPS:1527] RTCM On Demand?

From: "Steven R. Bible" <srbible@gate.net>
Date: Fri, 22 May 1998 21:40:58 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980522214058.0098ca20@pop.gate.net>
Rendered body type: text/plain

At 11:43 PM 5/20/98 -0500, you wrote:
>Thanks to the responses to my "RTCM Refresh Rate" thread, I am now aware of
>the diversity of rather strong opinions on this subject, and a few others.
>
>What a great way to develop insight into a subject!
>
>I have an idea for a compromise solution, which I will now describe in the
>hope that it will trigger a sequel. Any opinions, pro, con, or otherwise,
>will be greatly appreciated.
>
>To begin, I believe we have established the following:
>
>1. Differential GPS is of little or no use to most hams, but it is a lot
>of fun to play with for a few of us.
>
>For example, there is one ham out here who wants to find the corners of his
>newly-acquired ranch, and would be quite happy with 4-meter accuracy.
>
>2. APRS buffs don't need DGPS.

>
>But some that I know would like it to be available for emergency use. They
>have portable units that they keep hot for search and rescue events, etc.
>And those "maybe" events could be helped by the availability of DGPS.

Boy, this hurts. After pouring your heart into designing the DGPSIB and finding that hams and APRSers don't need it or have little use for it! I would not use such a small sampling to come to a conclusion as this. As Tom W3IWI has stated, he has be transmitting DGPS signals for over two years using a $25,000.00 Trimble. I created a system whereby hams can do it for much, much less. I am excited to bring such a system to ham radio so that people can learn and experiment. Tell me, how much have you learned about GPS and DPGS recently? Without the DGPSIB would you have learned about DGPS, or would you still think it is something the Coast Guard transmits for free?

Now, stop talking and making opinions and experiment. Try different rates, try different methods, think of something totally new, and then MEASURE it. I take exception to people making subjective remarks without the data/measurements to back it up.

Now, here's a brand new utility available to ham radio. What are you going to do with it? What new and unthought of application will someone come up with? Where is your inovation that hams are suppose to be full of?

>3. There is a lot of traffic on many packet channels, and the added load
>of a continuous and frequent RTCM beacon would displease the users. This
>especially if the beacon is rarely used.

I don't buy this. If the DGPS signal is transmitted and no one uses it, was the transmission wasted? (kind of like the tree falling in the forest) APRS is a one to many transmission, no acknowledgements. How is adding DGPS corrections every 10 to 15 seconds going to congest the channel? Again, Tom W3IWI has the most experience in this, and in the Baltimore area, no one has complained of too much congestion on the channel. I suggest you set your DGPS reference station up and try it. Get people to try the corrections. Let them learn about DGPS. Let them find out how useful DGPS is or is not. Let them learn!

>4. As so well stated by two responses (paraphrased), "DGPS should be done
>right if it is done at all", and "the refresh rate should be suitable for
>all potential users".
>
>Interpreted: Fast enough for the receiver with the quickest differential
>mode dropout.
>
>I propose "RTCM On Demand" as a solution for user groups that have an
>interest. Here is how it would work:
>
>The sponsoring group would maintain a reference station that is kept hot at
>all times. But the station would remain silent until a user had need for
>the correction.
>
>Said user would generate a beacon to request the service. On receipt of
>the beacon, the station would begin transmitting the RTCM strings at a
>suitable refresh rate for a limited period - say one or two minutes.
>Continued need for the corrections would require repeats of the requesting
>beacon at a shorter period.
>
>When the user's need ends, the request beacons cease and shortly thereafter
>the RTCM station becomes silent again.
>
>I can think of three ways to implement this. Here they are in order of my
>preference:
>
>First choice: Convince a TNC manufacturer to add the supporting feature.
>One way to implement it would be in a manner similar to the "Beacon
>Location Text" feature of the KPC-3 Plus, except the output beacon must be
>started by receipt of the string of the request beacon and must
>automatically expire after a specified period.
>
>Since RTCM data has no identifiable header, there would have to be an
>alternative way to deposit the records in a buffer to be sent out on the
>beacon.

The RTCM frame has a preamble of 66 hex.

>Another way for the TNC to cooperate would be to simply output a
>user-definable command string to the reference station upon receipt of the
>request beacon, thus starting up the station's output. The TNC would also
>have to issue the termination command string to the station at the end of
>the active period.
>
>Second choice: Develop an improved DGPSIB with the ability to intercept
>and filter the text of the request beacon (are you listening Steven
>N7HPR?). It would also have to deal with the time out.

See below.

>Third choice: Develop a little post-processor for the output of the TNC.
>This I could do, but the installation would be much more sanitary with
>choices 1 or 2. Besides, I'm still trying to build my steel-framed house
>with just my bare hands and a screw gun. I'd like to finish it before the
>next El Nino.
>
>Well, that's about it. It seems like a good solution to me, but before I'm
>convinced I'd like to hear what my list-server friends think.

The DGPS on demand has already been discussed years ago. Bob WA4APR
suggested a ?DGPS? command that would command a reference station to
transmit corrections. I spoke to Bob some months ago and asked if he
wanted to revisit the concept. It is open for discussion.

I am open to suggestions. I can create/design whatever people want. But I
must insist that you must first set your stations up and learn by doing.
Allow users to use the corrections. Let's inovate. Let's experiment. And
we'll have one tough DGPS system that can rival the USCG. This can easily
be the next ham utility. But if we talk ourselves out of it before we give
it a chance then it will never get off the workbench.

I don't think it has really sunk in to people yet, this DGPSIB is a low
cost, high performance DGPS reference station solution that costs less than
$500.00 to set up. The nearest commercial solution is several thousands of
dollars. Here's your chance to do what the big boys can. Here's your
chance to learn. Get to it!

 - Steve
 (n7hpr@tapr.org)

113. Re: [TACGPS:1545] Re: RTCM Refresh Rate

From: "Steven R. Bible" <srbible@gate.net>
Date: Fri, 22 May 1998 22:20:04 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980522222004.00996690@pop.gate.net>
Rendered body type: text/plain

At 08:40 PM 5/22/98 -0500, you wrote:
>> We also use a
>> compressed data format as RTCM, while standard, is incredibly
>> inefficient/verbose.
>
>Good idea, put that in the PIC based TX/RX as well :-)

Trimble and Motorola both have propritary formats for DGPS. The draw back
is that you need to have that brand of GPS on the transmit and receive end.
 The concept of the DPGSIB was to convert the Motorola Propritary Binary
Format to RTCM SC-104, a standard that all commercial GPS receivers
understand. The beauty of this sceme is that the remote user does not have
to own any special equipment. But if people want a compress format, I can
accomidate.

The RTCM SC-104 Type 1 frame is at max 80 bytes long. This assumes the
Oncore is tracking 8 satellites (then add the AX.25 overhead).   So at 1200
bps, it takes less than a second to transmit.

 - Steve
 (n7hpr@tapr.org)

114. Re: [TACGPS:1547] Re: RTCM or other DGPS binaries

From: "Ira A. Wilner" <bdcst@vermontel.com>
Date: Fri, 22 May 1998 23:33:55 -0400

To: srbible@gate.net
Cc: tacgps@tapr.org
Message-ID: <356643A3.4612738E@vermontel.com>
Rendered body type: text/plain

Steven R. Bible wrote:
>
> Trimble and Motorola both have propritary formats for DGPS. The draw back
> is that you need to have that brand of GPS on the transmit and receive end.
> The concept of the DPGSIB was to convert the Motorola Propritary Binary
> Format to RTCM SC-104, a standard that all commercial GPS receivers
> understand. The beauty of this sceme is that the remote user does not have
> to own any special equipment. But if people want a compress format, I can
> accomidate.

Ahh, the reason to include the option of sending the Motorola Oncore
proprietary binary COR sentances via a packet DGPS link is to be better
than the big guys! It is my understanding that the full COR binaries
includes carrier phase pseudorange data which would permit submeter
accuracy. This is something that the RTCM SC-104 type 1 message cannot
do even though all of the USCG reference stations record carrier phase
data!

And the comparable premium tier FM SCA or satellite delivered DGPS
services are very costly!

--Ira (W1IRA)

115. Re: [TACGPS:1546] Re: RTCM On Demand?

From: Bob Bruninga <bruninga@nadn.navy.mil>
Date: Sat, 23 May 1998 09:55:48 -0400 (EDT)
To: tacgps@tapr.org
Message-ID: <Pine.SOL.3.96.980523093813.13743A-100000@arctic>
Rendered body type: text/plain

On Fri, 22 May 1998, Steven R. Bible wrote:

> The DGPS on demand has already been discussed years ago. Bob WA4APR
> suggested a ?DGPS? command that would command a reference station to
> transmit corrections. I spoke to Bob some months ago and asked if he
> wanted to revisit the concept. It is open for discussion.

APRSdos REPLY/COMMENT: Here is where experience from those DGPS users
will help. Our original idea went somnething like this:

1) The DGPS station sends out a RTCM packet say, once every 5 minutes
always (useless, but lets you know it is there. APRS flags the user that
he is in a DGPS coverage area.)   Who knows, maybe the default rate could
be as short as 30 seconds depending on APRS activity in your area.

2) Then the DGPS station responds to the following commands:
    ?DGPS? 5, 5   Turns the DPGS on a a 5 second rate for 5 minutes.
    ?DGPS? 10, 30 Turns it on a 10 second rate for 30 minutes, etc
    ?DGPS   0,0   Turns it back to the default rate..

3) Even more sophistication could be added such as turning it on to a
high rate between the hours of X and Y, and the default rate otherwise.

Since Steve has a serial port on his DGPS engine, he could add the code to
allow the serial port to monitor the APRS channel and watch for the ?DGPS?
queries and resond accordingly. I would welcome such a capablity on APRS
channels. It is sure neat to have DGPS available to experimenters via
their existing APRS system. ONE OTHER thought is to add a TOUCH TONE
interface to it as well (this would be an add-on separate piece of
hardware) so that field users with only a
GPS and no laptop could activate the service...

bob wb4apr

116. Re: [TACGPS:1546] Re: RTCM On Demand?

From: Lyle Johnson <lylej@azstarnet.com>
Date: Sat, 23 May 1998 09:01:02 -0700
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980523090102.009365c0@pop.azstarnet.com>
Rendered body type: text/plain

>I don't think it has really sunk in to people yet, this DGPSIB is a low
>cost, high performance DGPS reference station solution that costs less than
>$500.00 to set up. The nearest commercial solution is several thousands of

>dollars. Here's your chance to do what the big boys can. Here's your
>chance to learn. Get to it!

Steve,

Yes, the DGPSIB is a kit that enables Amateur radio operators to experiment
with DGPS at the lowest cost on this particular planet!

My comments about RTCM and our mining experience were intended to indicate
a useful update rate for a local area with a number of active users - one
beacon every 10 to 20 seconds will yield 2-5 meter accuracies under current
SA policy with low cost GPS sensors.

We happen to use a compressed scheme because we have absolute control over
every unit in the mine, and program the attached comunications procesor.
Thus, we can easily do proprietary tings within the context of our
application, and we do :-) For general use, though, RTCM is *the* standard.

I have thought about DGPSIB having a baseband modulator so a receiving
station wouldn't need a TNC, but the receiving station would still need a
demodulator to recover the correction broadcasts. There are lots of
possibilities.

To start, though, I think you made the right decisions and field feedback
from experience is going to be the bast way to determine which changes, if
any, should be made.

Well done!

Lyle

117. So, What should I do?

From: Kenneth Lerman <Kenneth.Lerman@lerman.nai.net>
Date: Sat, 23 May 1998 19:38:49 -0400 (EDT)
To: tacgps@tapr.org
Message-ID: <199805232338.AA18996@lerman.nai.net>
Rendered body type: text/plain

...
>
> Now, stop talking and making opinions and experiment. Try different rates,
> try different methods, think of something totally new, and then MEASURE it.
> I take exception to people making subjective remarks without the
> data/measurements to back it up.
>
> Now, here's a brand new utility available to ham radio. What are you going
> to do with it? What new and unthought of application will someone come up
> with? Where is your inovation that hams are suppose to be full of?

...
>
> I don't think it has really sunk in to people yet, this DGPSIB is a low
> cost, high performance DGPS reference station solution that costs less than
> $500.00 to set up. The nearest commercial solution is several thousands of
> dollars. Here's your chance to do what the big boys can. Here's your
> chance to learn. Get to it!
>
>
> - Steve
> (n7hpr@tapr.org)
>

I'm somewhat new to ham radio this time around (I had a General class
license about 40 years ago), and could use some advice.

I presently have a novice class license and would like to set up
differential gps to make accurate maps for the local volunteer
ambulance corps.

Newtown, CT is a town of 60 square miles in western CT. It has the
rolling terrain typical of this part of the state. Our ambulance
communication takes place at 33.6 Mhz and seems to be effective,
although we do encounter some "dead spots" in town.

What should I use to set up a DGPS reference station? What band is
likely to be effective? What class license will I require? (I assume I
can pass a Tech test with a little study. 13 wpm code would require
significantly more effort.)

I've purchased some mapping software called Maptitude (for $400) which
works quite well on my Toshiba Libretto in my car. It supports gps
input.

As an aside, if there is anyone on the list from my area who might be
interested in doing some local propagation tests (who has some
equipment -- I have none), please let me know.

Thanks,

Ken

--
Kenneth Lerman   Kenneth.Lerman@lerman.nai.net
Systems Essentials Limited   Fax: (203)426-9138
55 Main Street   Voice: (203)426-4430
Newtown, CT 06470   http://lerman.nai.net/~lerman
PGP fingerprint = B1 66 29 FB CB 8C 6A 24 E1 DF B4 63 2C D6 5D AD

118. Re: [TACGPS:1551] So, What should I do?

From: Steve Sampson <ssampson@access.usa-site.net>
Date: Sat, 23 May 1998 20:54:37 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199805240154.UAA22486@access.usa-site.net>
Rendered body type: text/plain

[Empty message body]

119. TAC Colloquium at US Naval Observatory

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Mon, 25 May 1998 03:30:08 +0100
To: TACGPS <tacgps@tapr.org>
Message-ID: <3568E5C0.4881CED8@clark.net>
Rendered body type: text/plain

In case any of you will be in the DC area Friday, May 5th, I'm
slated to give the scientific colloquim at the US Naval Observatory
(next door to Al Gore's house). USNO colloquia are held on Friday
mornings at 10:30. Coffee and cookies at 10:00, lunch afterwards.
The title I suggested was something like:

  "Low-cost Time Synchronization: 30 nsec for $500 anywhere
   in the world!"

It's my intent to describe how/why my scientific programs needed
good time, then take the folks thru the development of the TAC, and
end up with a list of some of the applications that the TAC is
being used for. If any of you have a neat application, and can
supply me with a (.GIF, .JPG, .PDF, .BMP) photo I can use, I'll
give you some publicity.

Part of my idea in agreeing to do this colloquium is to show the
professional time-keepers just how their efforts are being used
in the real world. And a part of my desire is to show them that
the amateurs and "clock hackers" of the world are for real. At
Dayton I made the assertion that if he were alive today, John
Harrison would be a TAPRite time hacker (just like the Wright Bros.
& Robert Goddard would be active in AMSAT).

If any of you think you'll be in the area, let me know and I'll
help make arrangements so you can get thru the gate.

73, Tom

120. Re: [TACGPS:1553] TAC Colloquium at US Naval Observatory

From: Jeffrey Pawlan <jpawlan@pawlan.com>
Date: Sun, 24 May 1998 20:57:28 -0700 (PDT)
To: tacgps@tapr.org
Message-ID: <Pine.SOL.3.96.980524205245.19149C-100000@jpawlan>
Rendered body type: text/plain

Dear Tom,

  I think you meant June 5, not May 5. I will not be on the East Coast
to attend but will you by any chance be in Pasadena Calif necxt week
to attend the IEEE Frequency Control Symposium? I will be there all
week and want to meet with you if you are there. I will be staying at
the conference hotel (Ritz Carlton) so just call my room and leave a

msg.

  I will NOT check my email again before I leave for Pasadena in the
morning and will not have my computer with me.

73s,

Jeffrey Pawlan WA6KBL

Founder of the 50MHz and Up Group of N. Calif. and former technical
director of Project Oscar.

jpawlan@pawlan.com

121. Re: [TACGPS:1554] Re: TAC Colloquium at US Naval Observatory

From: clark@tomcat.gsfc.nasa.gov
Date: Mon, 25 May 98 04:28:47 UTC
To: tacgps@tapr.org
Cc: tacgps@tapr.org
Message-ID: <61962@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Jeff -- you are right -- it is JUNE 5th -- sri for the brain-fade!
And no, I won't be at the FCS.

73, Tom

122. Re: [TACGPS:1502] Re: TIC/TAC/TOC in our future?

From: "Ron L. Sparks" <rls@ibm.net>
Date: Mon, 25 May 1998 15:18:30 -0500
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980525151830.007cccd0@pop5.ibm.net>
Rendered body type: text/plain

Don,

Put me on your correspondence list. I am "toying" with the same concepts
that you are. I have just received my Rube, but have yet to power it up.
I am designing a simple step-up switcher supply so the thing will work on
13.8v and could be used with battery backup (and conceivably --portable).
My basic conceptual plan was right along the same lines as you -- use a PIC
to capture and compare the Rube to the GPS. I have a PIC programmer and
compiler set for the 16Cxx chips and was going to prototype on the 16F84.
It is about $5 in quantities. The HC11 looks like way more power than
needed for this project.

Anyway, my immediate concerns are in the software latency of the
microcontroller. It kinda' puts an unknown into the equation. I think it
could be taken out by experimentation on the data you get out of the end of
your Phase 1.

As a suggestion/question -- in Phase 2 why steer the Rube? The PIC will be
counting the Rube to 0.1uSec accuracy so why not just watch the comparison
and spit out a "leap 0.1 uSec" when needed? If your RMS noise is between 5
and 30 nS for the GPS then you could use the PIC to average the
differential between the Rube and GPS and keep a trend of the rolling
average. That trend would easily predect when the +/- 100nS adjustment
made sense. Since you would make the adjustment on a predictive basis the
maximum timestep could only be about +/- 50nS. This could be done by
having the PIC put/remove an extra count into the PLL divider when needed.
The output of the PLL would stay locked to the Rube but slip up or back to
stay long term calibrated to the GPS. That would hold your short term
stability to that of the Rube (10e-12?) with a 10e-7 adjustment which would
occur infrequently enough that the average jitter would be very low. An
additional benefit would be that during a LOS from the GPS your system
would still be 10e-9 accurate.

I am just doing this for fun so I am not sure what your design goals are.
What is the desired end result of all this?

Ron - KC5ODM

123. Re: [TACGPS:1550] Re: RTCM On Demand?

From: "Steven R. Bible" <srbible@gate.net>
Date: Mon, 25 May 1998 16:39:39 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980525163939.009547f0@pop.gate.net>
Rendered body type: text/plain

>To start, though, I think you made the right decisions and field feedback
>from experience is going to be the bast way to determine which changes, if
>any, should be made.

Thanks Lyle, I wasn't mad, I just want people to think and do, not just
talk themselves out of it.

Thanks for your feedback. Hopefully people will see that corrections rates
will work even at 10 or 15 seconds. It appears that we've discovered how
commercial GPS receivers are all treating DGPS differently.

- Steve
(n7hpr@tapr.org)

124. Re: [TACGPS:1556] Re: TIC/TAC/TOC in our future?

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Tue, 26 May 1998 01:20:45 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980526012045.00876880@appstate.campus.mci.net>
Rendered body type: text/plain

Ron,

I'd be glad to put you on the list. My goal for the project is just "fun"
and "learning." I got an email that my Rube is enroute, so it should
arrive very soon. My interest is more in an accurate frequency reference
than time. I'd like to drive the rigs with an accurate reference.

I too was thinking of doing a switcher to convert a 12v battery to 24 volts
for the Rube. I have a deep-cycle battery that I use to power the winch
for pulling up my sat tower, and powering other stuff such as the (very
old) laptop that logs the wx data. I'd be interested in your design for
the switcher.

There is no question that the HC11 is overkill for the project, but since I
have a few, plus all that it takes to do development, so I decided to use
them.

>Anyway, my immediate concerns are in the software latency of the
>microcontroller. It kinda' puts an unknown into the equation. I think it
>could be taken out by experimentation on the data you get out of the end of
>your Phase 1.

I'm not quite sure what the issue is with software latency. For steering
an oscillator, the output updating is slow. If the issue is the
measurement of time difference between the oscillator and the Rube (or
GPS), then latency between the event and the recognition of the event is
the same as jitter on the signal (GPS). I haven't looked at the PIC so I'm
don't know what features are available.

The Motorola line of micros have what they call "input capture." There is
an internal 16 bit (HC11, HC12) counter that counts down the bus frequency
after a prescaler (which can be set to divide by 1). A number of input
pins on port A (four in the case of the 'E series HC11 chips) have a 16 bit
latch which will latch the current counter count when the input changes
state (rising, falling, or either, can be programmed). This is
independent of the program operation, consequently, the software has no
effect on the timing. The only limitation is that with a 2 Mhz bus
frequency the resolution of the 16 bit count is 1/2 us. (I was reading
about the HC12 and it will run the bus at up to 8 Mhz, thus gaining a 4x
gain in resolution over the HC11). When the "input capture" latches the
time count of an event, an interrupt is set (if enabled, of course). The
software then reads the latched count and does its thing, though it does
have to service the interrupt before the next event (this means the time
between events must be greater than around 20 us, [but the resolution still
remains at 1/2 us]). With a divided-down frequency of 1 Khz, the interrupt
servicing far more time than necessary. One second is like a eon, in fact,
there is an issue of the 16 bit counter turning over (about 30 times) to
contend with (no fundamental problem, but requires some more interrupt
handling).

If the PIC must do the time difference measurement by polling the input
pin, then the time for the polling loop will effectively add jitter. I
don't know how fast the PIC can execute a polling loop.

>As a suggestion/question -- in Phase 2 why steer the Rube?

If accurate time is the goal, then inserting a "leap 0.1 us" would do the job just fine. For accurate frequency it needs to be steered. Your thought raises an interesting strategy, however. Suppose the micro drives a VCXO, providing a voltage either via DAC or PWM output. The purpose of the VCXO is to generate some frequency, say, the master oscillator for the HF rig. The VCXO is counted down and compared to the Rube, the Rube also counted down. The micro can then implement a servo loop to steer the VCXO to the Rube. Suppose, now, the Rube drifts. This can be corrected by the GPS. The Rube vs the GPS could generate a error (this error could include a rate-of-drift as well) and this error could be factored into the control of the VCXO. The result would be the VCXO would be held accurate by the GPS for long term, and Rube for short term, AND the Rube would not have to be steered. It would simplify the hardware and I like that! I'll have to think about it.

A phase-locked loop appears to be the way to handle the steering. I got a MSEE at Northwestern in 1961 and had some servomechanism courses (not sure what they call it today...). I haven't used the theory for "ages" so I am pretty rusty on it. I dug out my old textbooks and have been pouring over them. It looks like a simple lag-lead network, which translates into one multiply and some addition is all that is needed in the micro, though it may require quite a few digits (bytes) to achieve the needed accuracy. It looks like the servo loop goal is one of minimizing the noise bandwidth while maintaining lock. This results in loop filter time-constant of the order of 1E-10 or lower. The effect of the loop filter is about the same as doing a running average and computing a error and rate of drift. In fact, one book by R.W. Hamming uses a running average as an example of easy-to-implement, but not so efficient, low-pass digital filter. Doing a least-squares line-fit to the time difference measurments would accomplish the generating a error and rate-of-drift (trend) measurement. For computational efficiency I think one needs to filter the difference measurement first, decimate, then use compute the error/trend on these points, the main problem being storage as well as computing time to handle averaging periods that may run well over a day (86,400 sec/day). Anyway, the best way to handle some of these things emerge from playing with the data from Phase 1. Once I get some data I figure I can simulate some of these schemes.

Keep informed with what you are doing with the PIC. One of these days I'll have to sit down and study it.

73's
Don

125. TACs (indirectly) in the news today

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Wed, 27 May 1998 12:57:54 -0400
To: TACGPS Maiing List <tacgps@tapr.org>,
"karn@qualcomm.com" <karn@qualcomm.com>
Message-ID: <356C4611.A1474EF7@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

I'm attaching an item that appears on Reuters today that indirectly relates to my TAC activities.

Here is the chain -- for some years I have directed NASA's program to use the radio astronomy technique known as Very Long Baseline Interferometry (VLBI) to make high accuracy geodetic measurements. You can glean some information on our VLBI program from our web site at http://lupus.gsfc.nasa.gov

With VLBI we connect radio telescopes all around the world together coherently, using Hydrogen Maser frequency standards as our time/ frequency reference, and recording wideband noise from quasars onto magnetic tape (our newest systems record at 1 Gbit/sec at each station, resulting in terabits of information per day!).

With VLBI we are able to measure the apparent position of quasars at the far edges of the universe with accuracies of a few tens of microseconds of arc. It is these measurements that are used by the us (and supplied to the IERS -- International Earth Rotation Service) to define the rotation of the earth to a few microseconds of time. The earth's actual rotation (called UT1) is subject to all kinds of external perturbations -- changes in angular momentum due to atmospheric winds and ocean circulation, motion of molten material in the earth, etc.

I originally developed the TAC as a way to keep the Maser clocks at all the stations synchronized in atomic time (UTC, as maintained/

distributed by the US Naval Observatory) the to a few tens of nsec.
We needed this synchronization for operational efficiency, and as
so that we could measure the changes in UT1-UTC due to changes in
in the earth. Nearly all the VLBI stations around the world use TACs,
and much of the data I have posted to describe the TAC performance
comes from comparisons between the TACs, the VLBI site masers, and
the USNO master clock.

In this article VLBI isn't mentioned, but it is the basis that John
Gipson and I based the VLBI El Nino length-of-day studies on. VLBI,
observing quasars at the edge of the universe with radio astronomical
techniques, has proven to be the best (and totally independent)
"proxy" against which scientists developing global climate models,
studying changes in atmospheric and oceanic circulation, etc can
test their models and predictions. And it's all tied together
with TACs!

The GPS reference attributed to Byron Tapley in the last paragraph
concerns the factoid that the information used by all GPS users to
transform from an ECI (earth centered inertial) reference frame
(where the satellites "live") into en ECEF (earth centered, earth
fixed) reference frame (where we live) comes from the IERS and USNO
and appears in the operational 1500 bit message sent every 30 seconds
by each GPS satellite.

73, Tom

    -=-

>   Study says El Nino slows Earth's rotation
>
>   Posted May 27, 1998 6:51 AM EDT
>
>   By Leslie Gevirtz
>
> BOSTON (Reuters) - If you have noticed the days are getting a
> little longer, you are right -- and it's not just the change of
> season -- scientists said Tuesday.
>
> Researchers gathered in Boston for a meeting of the American > Geophysical Union blamed El Nino and
its effects on the atmosphere
> for slowing the Earth's rotation by almost a thousandth of a second.
>
> ``The energy is going from the Earth into the atmosphere. The
> Earth is slowing down,'' NASA's Goddard Space Flight Center
> scientist Dr. John Gipson told reporters. He estimated that at
> its peak in July 1997, El Nino slowed the Earth's rotation by
> 800 microseconds.
>
> Throughout the El Nino period, which is expected to taper off
> later this summer or in the fall, the Earth's rotation has slowed
> by an average of 300 to 400 microseconds, Gipson said.
>
> ``My guess is that following the current El Nino, we're going to
> through one of those periods where the Earth speeds up and makes
> the days shorter'' in a La Nina episode, Gipson said.
>
> This is not the first time an El Nino has made the days longer.
> The 1982-83 El Nino also slowed the Earth's rotation, but not by
> such a large amount, the scientists said.
>
> During an El Nino, the ocean temperature is raised in the
> eastern Pacific and reduced in the western Pacific.
>
> The phenomenon, which has been blamed for floods in Ecuador,
> droughts in Indonesia and ice storms in Quebec and the U.S.
> northeast, changes the ocean currents and the intensity and
> direction of atmospheric winds. This large scale shift in winds
> and currents changes the length of day by an amount measurable by
> sophisticated space-based methods.
>
> La Nina is the opposite phenomenon with the water temperature in
> the western Pacific rising, while the eastern Pacific gets colder.
> It too affects the Earth's rotation causing it to speed up, but
> ``only about three-quarters as much'' as El Nino slowed it down,
> Gipson said.
>
> Dr. Jean Dickey of NASA's Jet Propulsion Laboratory said that
> while the average person would probably not be affected by such

> a small shift in the Earth's rotation, ``it plays a very important
> role in inter-planetary navigation.'' She called it a ''critical
> factor in the success of the Pathfinder mission to Mars.''
>
> University of Texas at Austin Professor Byron Tapley added the
> speed of the Earth's rotation was also key to the functioning of
> the Global Positioning System (GPS) used by ships, planes and the
> military.
>
> Copyright © 1998 Reuters Limited. All rights reserved.
> Republication or redistribution of Reuters content is expressly
> prohibited without the prior written consent of Reuters. Reuters
> shall not be liable for any errors or delays in the content, or
> for any actions taken in reliance thereon.

126. Rhubidium, GPS & Microcontrollers - TAC toy?

From: "Ron L. Sparks" <rls@ibm.net>
Date: Wed, 27 May 1998 20:38:24 -0500
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980527203824.007d0100@pop5.ibm.net>
Rendered body type: text/plain

Don,

If others on the TACGPS list get bored with this I will be glad to move it
to a private discussion, otherwise here goes:

You wrote:
>My goal for the project is just "fun"
>and "learning." I got an email that my Rube is enroute, so it should
>arrive very soon. My interest is more in an accurate frequency reference
>than time.

That is good to know because that is my goal too. Obviously, the design
can be optimized for that primary function with time as secondary and it
should help reduce compexity and cost.

>I'd be interested in your design for the switcher.

I will send it to you. What graphics format do you prefer pcx, tif, or
whatever.

>I'm not quite sure what the issue is with software latency. [snip] then
latency between >the event and the recognition of the event [snip] The
Motorola line of micros have >what they call "input capture."

That is exactly what I meant by latency. I am new to PIC's and was
concerned that by using them to count between the GPS event and the Rube
would require a tight timing loop. Then I read your description of input
capture and realized the PIC's have the same feature with a different name.
 It would eliminate the problem I was thinking about.

By the way, as I read your discussion it occurred to me that the PIC that I
am experimenting with (16F84) uses a 10 MHz clock. How convenient! The
Rube can become the base clock for the PIC and they will, by definition
always be locked together!
Your discussion about the VCXO is exactly what I was thinking about when I
wrote the sentence. If the Rube and the PIC were locked then it should be
easy to steer the VCXO with the as you suggested and simultaneously use the
GPS pulse to give drift calibration to the whole rig. It could then even
give the absolute time correction to attach to the Rube to give precise time.

>A phase-locked loop appears to be the way to handle the steering. I got a
>MSEE at Northwestern in 1961 and had some servomechanism courses (not sure
>what they call it today...).

Mine was a BSEE at Texas A&M in '74. We called the courses "Control
theory" and it was the second most difficult course I had to deal with.
The best I ever got was rusty <grin>.

>Keep informed with what you are doing with the PIC. One of these days I'll
>have to sit down and study it.

Piece of cake. Its like my old TRS-80 Model one all over again, but first
class -- "first class" means that you have a BASIC compiler. Other than
that it is the same old direct hardware access, TINY program space,
limited I/O, and a long program/compile/test/debug loop. I guess its the
story of my life -- a Sparks Deja Loop <snicker>.

Best,
Ron

127. ONCORE battery

From: Garren Davis <g_davis@qlc.com>
Date: Fri, 29 May 1998 09:38:21 -0700
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <8357B2D4F4C1D111B8E9006097D610180314B1@ntmail.qlc.com>
Rendered body type: text/plain

Hi,
I received my ONCORE from TAPR and it works great with the TAC32
software. I have a question about the small battery on the ONCORE.
Is the foam under the battery an insulator that is supposed to be removed
or is it there for some other reason? I tried to remove it but it started to

tear apart.
Thanks for the help.

Garren
g_davis@qlc.com

128. Re: [TACGPS:1561] ONCORE battery

From: "Steven R. Bible" <srbible@gate.net>
Date: Fri, 29 May 1998 15:20:05 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980529152005.009cabf0@pop.gate.net>
Rendered body type: text/plain

At 11:40 AM 5/29/98 -0500, you wrote:
>
>
>Hi,
>I received my ONCORE from TAPR and it works great with the TAC32
>software. I have a question about the small battery on the ONCORE.
>Is the foam under the battery an insulator that is supposed to be removed
>or is it there for some other reason? I tried to remove it but it started to

Garren, I'd leave the foam there. I believe it is an insulator. I'd also
recommend that you leave the white smoke in the integrated circuits. If
you remove it they will stop working :-).

 - Steve
 (n7hpr@tapr.org)

129. Garmin 20SL and $PGRME and various

From: Eduardo Jacob <edu@kender.es>
Date: Fri, 29 May 1998 22:53:02 -0100
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980529225302.0087e8b0@kender.es>
Rendered body type: text/plain

I am an absolute beginner to GPS technology.

        I have just prepared the TAC-2 interface along with a Garmin 20SL
receiver. I have tried it with an evaluation version of tac32 and with SA
watch. The problem I have found is that with SA Watch I cannot select
Garmin receiver. I have contacted Stan Hunting and send the report SA Watch
prepares and he quickly answered my that the garmin seemed not to send the
$PGRME sentence which is needed. He suggested to configure the receiver as
a "Northstar" and everything should work. Well it seems to work but it
seems not to send EPE information. When reading the 20sl manual it is
stated that this instruction exists and it even explain how to send the
command to enable it. I've tried to enable all commands but it doesnt' seem
to react. What I do is to send the command is to prepare a file with one of
these instructions:

$PGRMO,,3*hh or $PGRMO,$PGRME,1*hh

        After that I enter a terminal program configured to 4800 bds (I can see
all the sentences the GPS is sending) and then I send the file with an
ASCII upload (I take care to assure the CR.LF are in the file), but nothing
happens.

        Any ideas? Am I missing something important? Also in a week I've been

playing with SA Watch I have never seen HDOP go under 2.0 (it's allways
very about 5 or 6. Which could be the reason?, perhaps that I can only
cover half of the sky?, I use it from a window in a block building. Where
could I find another reading in the net after the GPS.FAQ?

        Also when I begin getting fix errors it never resynchronizes is it tha
normal behaviour?

        Regards

        Eduardo/EA2BAJ

130. Re: [TACGPS:1561] ONCORE battery

From: "Ira A. Wilner" <bdcst@vermontel.com>
Date: Fri, 29 May 1998 18:43:11 -0400
To: tacgps@tapr.org
Message-ID: <356F39FF.E3EEF361@vermontel.com>
Rendered body type: text/plain

Garren Davis wrote:
>
> Hi,
> I received my ONCORE from TAPR and it works great with the TAC32
> software. I have a question about the small battery on the ONCORE.
> Is the foam under the battery an insulator that is supposed to be removed
> or is it there for some other reason? I tried to remove it but it started to
>
> tear apart.
> Thanks for the help.
>
> Garren
> g_davis@qlc.com

Gaak! Leave it alone. It appears to be for mechanical stability and
vibration. The battery is connected and is keeping the CMOS memory
alive including a factory downloaded almanac. If you tear at it you
might disconnect the battery!

--Ira (W1IRA)

131. RE: [TACGPS:1561] ONCORE battery

From: Garren Davis <g_davis@qlc.com>
Date: Fri, 29 May 1998 16:32:12 -0700
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <8357B2D4F4C1D111B8E9006097D610180314B3@ntmail.qlc.com>
Rendered body type: text/plain

I didn't tear at it too much. Just enough to see that it wasn't going to
come out
easily. The reason I thought it should come out is that after I turned off
the
power to the ONCORE it took a long time to aquire the sats when I turned the

power back on. I have seen insulators on batteries on some consumer products

so the battery would not run down until it was purchased and the consumer
removed the insulator. I thought this might be the same way. I will get the
meter
out and make some measurements.
Thanks for the replies.

Garren

> ----------
> From: Tom Van Baak[SMTP:tvb@veritas.com]
> Reply To: tvb@veritas.com
> Sent: Friday, May 29, 1998 3:57 PM
> To: Garren Davis
> Subject: Re: [TACGPS:1561] ONCORE battery
>
> Garren Davis wrote:
> >
> > Hi,
> > I received my ONCORE from TAPR and it works great with the TAC32
> > software. I have a question about the small battery on the ONCORE.
> > Is the foam under the battery an insulator that is supposed to be
> removed
> > or is it there for some other reason? I tried to remove it but it
> started to

> > tear apart.
>
> Is it double-stick tape (to keep the battery in place); the
> same kind pf foam-like tape that 3M makes for photographs.
>
> /tvb
>

132. Re: [TACGPS:1563] Garmin 20SL and $PGRME and various

From: Dave Martindale <davem@cs.ubc.ca>
Date: Fri, 29 May 1998 17:48:58 -0700
To: tacgps@tapr.org
Message-ID: <l03130302b19506e9b359@[198.162.38.159]>
Rendered body type: text/plain

>I've tried to enable all commands but it doesnt' seem
>to react. What I do is to send the command is to prepare a file with one of
>these instructions:
>
>$PGRMO,,3*hh or $PGRMO,$PGRME,1*hh

There are several problems here. The "hh" is supposed to be replaced by a hexadecimal checksum if present. You add up all the bytes between certain markers, then express that 8-bit quantity as a 2-character hexadecimal number in ASCII. But you can leave it out entirely. The Garmin receiver will accept commands without checksums, but it will discard ones with incorrect checksums.

Thus you need to send:

$PGRMO,,3<CR><LF>

The other form, to turn on just that one sentence, would be:

$PGRMO,PGRME,1<CR><LF>

You don't need the dollar sign in front of the sentence that you are turning on.

>Also in a week I've been
>playing with SA Watch I have never seen HDOP go under 2.0 (it's allways
>very about 5 or 6. Which could be the reason?, perhaps that I can only
>cover half of the sky?, I use it from a window in a block building.

That could certainly cause bad geometry and high DOP values.

Dave

133. Re: [TACGPS:1563] Garmin 20SL and $PGRME and various

From: Gary Sanders <gsanders@gte.net>
Date: Sat, 30 May 1998 00:06:04 -0400
To: tacgps@tapr.org
Message-ID: <356F85AC.791C3BF8@gte.net>
Rendered body type: text/plain

The symptom is _EXACTLY_ the same as my GPS20 exhibits when used with TAC32 and then using it with SAWatch.

What is happening is TAC32 is turning off a whole pile of sentences when it initializes the receiver. Then, when you try to run the GPS20 with SAWatch, it won't run because several sentences it needs are missing.

This scenario is very repeatable - enable all needed sentences, run TAC32 (which runs fine), check for sentences - most are now disabled.

I contacted both authors (Please, no flames for the following), and Rick (the author of TAC32) said he doesn't turn off any sentences, so I should talk to Stan, and Stan said talk to the author of TAC32, 'cause he needs the sentences that are turned off to use the GPS20 option on his program!

So I gave up.

If you want an easy way to turn the Garmin sentences on and off, contact Garmin's Tech Support. They can email you a couple of small programs that make it easy to do it. One is a Windows program called gpscfg.exe, and the other is a DOS program called nmeavwr.exe.

(Again, please don't flame me too much - I'm just relating it as it
happened.)

Gary Sanders   WB0BZR

Eduardo Jacob wrote:
>
>   I am an absolute beginner to GPS technology.
>
>   I have just prepared the TAC-2 interface along with a Garmin 20SL
> receiver. I have tried it with an evaluation version of tac32 and with SA
> watch. The problem I have found is that with SA Watch I cannot select
> Garmin receiver. I have contacted Stan Hunting and send the report SA Watch
> prepares and he quickly answered my that the garmin seemed not to send the
> $PGRME sentence which is needed. He suggested to configure the receiver as
> a "Northstar" and everything should work. Well it seems to work but it
> seems not to send EPE information. When reading the 20sl manual it is
> stated that this instruction exists and it even explain how to send the
> command to enable it. I've tried to enable all commands but it doesnt' seem
> to react. What I do is to send the command is to prepare a file with one of
> these instructions:
>
> $PGRMO,,3*hh or $PGRMO,$PGRME,1*hh
>
>   After that I enter a terminal program configured to 4800 bds (I can see
> all the sentences the GPS is sending) and then I send the file with an
> ASCII upload (I take care to assure the CR.LF are in the file), but nothing
> happens.
>
>   Any ideas? Am I missing something important? Also in a week I've been
> playing with SA Watch I have never seen HDOP go under 2.0 (it's allways
> very about 5 or 6. Which could be the reason?, perhaps that I can only
> cover half of the sky?, I use it from a window in a block building. Where
> could I find another reading in the net after the GPS.FAQ?
>
>   Also when I begin getting fix errors it never resynchronizes is it tha
> normal behaviour?
>
>   Regards
>
>   Eduardo/EA2BAJ

--

Gary Sanders

Bait for spammers (With credit to E. Needham):
root@localhost
postmaster@localhost
admin@localhost
abuse@localhost
postmaster@127.0.0.1

134. Garmin 20SL and $PGRME and various

From: Eduardo Jacob <edu@kender.es>
Date: Sat, 30 May 1998 08:01:15 -0100
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980530080115.0082c3e0@kender.es>
Rendered body type: text/plain

Thanks to everybody. Now everything is correct. Now I only will have to
study how to prolong the cable antenna for 10 meters :-(

        Eduardo

135. RE: [TACGPS:1567] Re: Garmin 20SL and $PGRME and various

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sat, 30 May 1998 09:43:58 -0400
To: <tacgps@tapr.org>
Message-ID: <000301bd8bd0$ff5d3980$101161cf@rick.cnssys.com>
Rendered body type: text/plain

Gary,

I reviewed your original messages and I clearly misunderstood your question.
Not having SA Watch I didn't understand the problem until this round of
discussions.

Yes, TAC32 does turn off this message. In fact, TAC32 turns off ALL

messages and then enables only the messages it needs. My reasoning was that
the NMEA mode is so cluttered with messages and is running at such a low
data rate that I wanted to make TAC32 as responsive as possible. There was
no easy way to determine the original state of the receiver so I assumed
that other programs would set up the message set to their own liking.
Apparently SA Watch does not do this.

I will take this into account in a future release of TAC32. In fact, I may
be using $PGRME in a future release anyway so it may be left on.

Rick
WB2TNL

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Gary Sanders
Sent: Saturday, May 30, 1998 12:12 AM
To: tacgps@tapr.org
Subject: [TACGPS:1567] Re: Garmin 20SL and $PGRME and various

The symptom is _EXACTLY_ the same as my GPS20 exhibits when used
with TAC32 and then using it with SAWatch.

What is happening is TAC32 is turning off a whole pile of sentences
when it initializes the receiver. Then, when you try to run the
GPS20 with SAWatch, it won't run because several sentences it needs
are missing.

This scenario is very repeatable - enable all needed sentences, run
TAC32 (which runs fine), check for sentences - most are now disabled.

I contacted both authors (Please, no flames for the following), and
Rick (the author of TAC32) said he doesn't turn off any sentences,
so I should talk to Stan, and Stan said talk to the author of TAC32,
'cause he needs the sentences that are turned off to use the GPS20
option on his program!

So I gave up.

[snip]

136. TAPR Office Closure

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Sat, 30 May 1998 13:42:11 -0500
To: "TAPR-BB list   mailing"<tapr-bb@tapr.org>,
        "NETSIG list   mailing"<netsig@tapr.org>,
        "APRS SIG list   mailing"<aprssig@tapr.org>,
        "HF SIG list   mailing"<hfsig@tapr.org>,
        " Spread Spectrum "<ss@tapr.org>,
        "BBS SIG list   mailing"<bbssig@tapr.org>,
        " tacgps "<tacgps@tapr.org>
Message-ID: <v04003a09b19601d3362e@[207.8.125.50]>
Rendered body type: text/plain

The TAPR office will be closed for at least two weeks beginning Monday.

Dorothy Jones, KA5DWR, Office Manager underwent surgery this morning and
will be in the hospital the rest of this week recovering. Good news is
that the surgery went well and we are waiting for Dorothy now to get out of
post-op.

E-Mails, Faxes, and Calls to the office will still be accepted, but expect
delays in getting kits and publications shipped until things get back to
normal at the Jone's household. I'll be heading to Denton to help at the
office while Dorothy is recovering, but things will be slowed down until
Dorothy is feeling better.

You can send flowers or greetings to:
        Denton Community Hospital
        207 North Bonnie Brae
        Denton TX 76201
        Telephone: 940 898-7000
        Room 139, Dorothy T Jones

I will be taking e-mail up to her if you want to send something by e-mail.

Greg Jones, WD5IVD
Pres. TAPR

```
-----
Greg Jones, WD5IVD                 Austin, Texas
wd5ivd@tapr.org      http://www.tapr.org/~wd5ivd


Real World, The n.:
        5. Anywhere outside a university.  "Poor fellow, he's left UT
Austin and gone into the real world."
```

137. TAC32 NMEA Messages and rates

```
From: Robert Winingham <kc5ejk@onramp.net>
Date: Sat, 30 May 1998 12:36:27 -0600
To: tacgps@tapr.org
Message-ID: <v03102800b1960101fdbe@[206.50.200.3]>
Rendered body type: text/plain
```

```
>Yes, TAC32 does turn off this message.  In fact, TAC32 turns off ALL
>messages and then enables only the messages it needs.

You might want to post a list of which messages and the rates
that TAC32 does set for each GPS. (Oncore,Garmin)

I made a list once and I think they are all once per sec.

The Default you use works for most programs I use ( APRS)
I sometimes need to turn on RMC.

73


Bob - Dallas,TX ---  kc5ejk@onramp.net  or  kc5ejk@amsat.org  ---
```

138. Re: [TACGPS:1569] Re: Garmin 20SL and $PGRME and various

```
From: Gary Sanders <gsanders@gte.net>
Date: Sat, 30 May 1998 20:06:24 -0400
To: tacgps@tapr.org
Message-ID: <35709F00.4E0190DD@gte.net>
Rendered body type: text/plain
```

```
Rick,

Thank you for the explanation.  It's entirely possible that I didn't
explain it very well in our previous communication.  It certainly
wouldn't be the first time for me!

Gary

Richard M. Hambly wrote:
>
> I reviewed your original messages and I clearly misunderstood your question.
> Not having SA Watch I didn't understand the problem until this round of
> discussions.
>
> Yes, TAC32 does turn off this message.

--

Gary Sanders

Bait for spammers (With credit to E. Needham):
root@localhost
postmaster@localhost
admin@localhost
abuse@localhost
postmaster@127.0.0.1
```

139. 1998 ARRL and TAPR Digital Communications Conference

```
From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Sun, 31 May 1998 14:10:14 -0500
To: "HF SIG  list   mailing"<hfsig@tapr.org>, " Spread Spectrum "<ss@tapr.org>,
        " TAPR/AMSAT DSP "<dsp@tapr.org>,
        "APRS SIG  list   mailing"<aprssig@tapr.org>,
        "NETSIG  list   mailing"<netsig@tapr.org>,
        "BBS SIG  list   mailing"<bbssig@tapr.org>,
        " tacgps "<tacgps@tapr.org>, aprsnews@tapr.org, mic-e@tapr.org,
        TAPR Regional Freq <regional_freq@tapr.org>
Message-ID: <v04003a01b1975b5f40bd@[207.8.125.50]>
Rendered body type: text/plain
```

1998 ARRL and TAPR Digital Communications Conference
September 25-27, 1998
Chicago, Illinois (minutes from O'Hare Airport)

Web: http://www.tapr.org/dcc

It's that time again! Mark your calendar and think about what to publish for the upcoming 17th Annual ARRL and TAPR Digital Communications Conference. This is the third year in which the ARRL Digital Communications Conference and TAPR Annual General Meeting are joined into one conference!

The ARRL and TAPR Digital Communications Conference is an international forum for radio amateurs in digital communications, networking, and related technologies, who meet, publish their work, and present new ideas and techniques for discussion. Presenters and attendees have the opportunity to exchange ideas and learn about recent hardware and software advances, theories, experimental results, and practical applications. The Digital Communications Conference is not just for the digital expert, but for digitally-oriented amateurs at all levels of expertise.

The 1998 ARRL and TAPR Digital Communications Conference will be held September 25-27, 1998, in Chicago, Illinois. This year's conference location is the Holiday Inn Rolling Meadows, just minutes from O'Hare Airport.

Not only is the Digital Communications Conference technically stimulating, it is a weekend of fun for all who have more than a casual interest in any of the ham digital communications modes. This includes APRS operators, digital networks, software writers, modem designers, and digital satellite enthusiasts. The ARRL and TAPR Digital Communications Conference is for all levels of digital operators -- a must conference to attend to become active on a national level. Now, more than ever, amateur radio needs this great meeting of the minds because it is important that we demonstrate a continued need for the frequency allocations we have by pushing forward and documenting our achievements. The ARRL and TAPR Digital Communications Conference is one of the few ways to record our accomplishments and challenge each other to do more.

A Conference for the Beginner, Too

The conference is not just for the digital expert. This year's conference again provides multiple session tracks for beginning, intermediate, and advanced presentations on selected topics in digital communications. Topics will include APRS, satellite communications, TCP/IP, digital radio, Spread Spectrum, and many others. Come to the conference and hear these topics presented by the experts! Don't miss this opportunity to listen and talk to others in these areas.

Symposia and Seminars

In addition to the presentation of papers on Saturday, three symposia/seminars will be held. These sessions are provided to allow those with additional time and interest to make the most of the Digital Communications Conference. For those who may have interest in just one symposium or seminar, registration for the conference is not required to attend these activities. This allows maximum flexibility for those who may want to participate during the Digital Communications Conference, but do not have an entire weekend to devote to the event.

The Second APRS National Symposium will be held on Friday and will be moderated by Steve Dimse, K4HG (the developer of javAPRS). It will likely include many APRS software authors, such as Bob Bruninga, WB4APR (the father of APRS), Keith Sproul, WU2Z, Mark Sproul, KB2ICI (the developers of MacAPRS and WinAPRS), Brent Hildebrand, KH2Z (the developer of APRSPLUS), and other nationally-known APRS leaders. Join this group for the afternoon and evening for in-depth discussions and presentations on the current and future status of APRS. This is a unique opportunity to gain insight into this fast-growing digital aspect of amateur operations that combines computers, packet radio, and GPS (Global Positioning System).

Starting late Friday afternoon, a half-day seminar titled "Infrastructureless Technologies in Amateur Radio," presented by Don Lemke,

WB9MJN, will cover the pros and cons of DDMA (directivity division multiple access, a proposed infrastructureless technigue) versus hubbed (cellular style) and other infrastructure dependant techniques, the basic problem of megabaud rate communications into the ham QTH, and some techniques for channel-area acquisition including full duplex/asynchronous versus simplex/synchronous radio/acquisition concepts. This seminar will start late enough on Friday afternoon to allow those flying that day to attend the seminar.

The Sunday morning seminar will be a combination of two different talks that will make one excellent seminar. The first presentation, by Lyle Johnson, WA7GXD, will focus on the upcoming RUDAK digital communications system scheduled to fly on the AMSAT Phase 3D satellite in the near future. Lyle will discuss features, systems design, integration, and experiments. The goal of the presentation is to zero in on the communications capabilities of RUDAK, the performance to be expected from the 153k6 PSK system, the limitations and capacities of the DSP modems, user requirements for receiving RUDAK, requirements for transmitting to RUDAK, and how amateurs can work to make ground operations a reality once the satellite is in operation. Information on how to submit a proposal for experimental time on RUDAK will be presented. The second presentation will be by Tim Shepard, KD1KY, regarding "Packet Radio Networks with Millions or Billions of Stations." This talk will present concepts and materials that make you think about different possibilities of networking in the future. Both Lyle's and Tim's presentations focus on different aspects of future digital communications possibilities.

Third Annual ARRL and TAPR DCC Student Papers Award

ARRL and TAPR especially welcome papers from full-time students to compete for the third annual student papers award. Two $500 travel awards may be given, one in each of the following categories: a) best technical/theory-oriented paper by a student, and b) best educational or community-oriented application paper by a student. The paper should relate directly to a wireless digital communication topic (see the guidelines for more information). Papers co-authored by educators or telecommunications professionals are also eligible for this award as long as a student is the first author. The deadline for receipt of finished student paper manuscript is June 20, 1998. Please note that this deadline is different from the general conference paper submission date. For full details and paper guidelines contact TAPR or browse to http://www.tapr.org/dcc.

Call for Conference Proceeding Papers

Anyone interested in digital communications is invited to submit a paper for publication in the Conference Proceedings. Presentation at the conference is not required for publication. The primary purpose of the conference is to communicate ideas and techniques regarding digital communications. Papers written in an informal style are welcome, as well as those written to academic standards. If you know of someone who is doing great things with digital communications, be sure to tell them about this! Papers are due by August 15, 1998, and should be submitted to Maty Weinberg, ARRL, 225 Main Street, Newington, CT 06111, or via e-mail to lweinberg@arrl.org. The paper submission guidelines are available on-line (http://www.tapr.org/dcc).

Local/International Co-Host

The 1998 ARRL and TAPR Digital Communications Conference will be co-hosted by Chicago Amateur Packet Radio Association (CAPRA). CAPRA is one of the oldest packet radio groups in the US. It focuses on education about amateur packet radio, coordination of joint efforts of hams interested in packet radio, and technical and equipment support for a sound packet network in the Chicago area. They have had high-speed packet networks operational since the mid-1980s. Visit the CAPRA Web site at http://www.imaxx.net/capra for more information.

PRUG (Packet Radio User Group of Japan) will be the first International co-host of the ARRL and TAPR Digital Communications Conference. The conference is proud to welcome PRUG as part of the conference. PRUG will be hosting an informal social Friday evening after the seminar and symposium are completed. Visit http://www.prug.or.jp for more information about the organization.

What can you expect during the 1998 ARRL and TAPR Digital Communications Conference?

* A full day of papers, breakout sessions, and selected topics on Saturday for the beginner to advanced amateur digital enthusiast.

* Three seminars/symposia
  Friday (1 PM)
  - Second Annual APRS National Symposium,
    moderated by Steve Dimse, K4HG

  Friday (3 PM)
  - Infrastructure Technologies in Amateur Radio
    conducted by Don Lemke, WB9MJN

  Sunday (8:30 AM)
  - RUDAK Future Operations and Experimentations
    by Lyle Johnson, WA7GXD
  - Packet Radio Networks with Millions or Billions of Stations
    by Tim Shepard, KD1KY

* Third Annual Student Paper Awards.

* TAPR Membership Meeting

* A banquet with special guest speaker Steve Roberts, N4RVE, of Nomadic Research Labs. Creator of the Winnebiko and Behemoth high-tech recumbent bicycles. His current project is focused on Microship technology (http://www.microship.com/).

* SIGs (Special Interest Groups) get-togethers on Saturday, following the banquet

* Informal get-togethers throughout the weekend

* A facility that is perfect for this type of conference

* Informal engineering discussions/demonstration areas

* Motorola Museum located in the area.

* An event at which the most important new developments in amateur digital communications are announced

* Digital 'movers and shakers' from all over the world in attendance

---

Conclusion

If you have attended a Digital Communications Conference in the past, remember how much fun it was discussing the latest developments into the wee hours! If you have never been to a Digital Communications Conference, then make your plans now to attend and find out how much fun they can be.

There are few activities where your participation can be so much fun and so important! You will be able to get together with colleagues from all over the world and bring each other up to date on your latest work. Experience all this and more for an unforgettable weekend of ham radio and digital communications. Make your travel and lodging arrangements now. We hope to see you at the ARRL and TAPR Digital Communications Conference, September 25-27!

Full information on the conference and hotel information can be obtained by contacting Tucson Amateur Packet Radio, 8987-309 E. Tanque Verde Road #337, Tucson, AZ 85749-9399, phone 940-383-0000, fax 940-566-2544, e-mail tapr@tapr.org, browse www.tapr.org/dcc.

Sincerely,

Steve Ford, WB8IMY, ARRL Conference Co-Chair
Greg Jones, WD5IVD, TAPR Conference Co-Chair
Steve Stroh, N8GNJ, Conference Manager
Mark J. Thompson, WB9QZB, Local Host Liaison
Carl Bergstedt, K9VXW, Local Host Liaison

Note: If you need conference handouts or flyers for ham club meetings,
contact TAPR to get what you need!

Hotel Information

Conference presentations, meetings, and seminars will be held at the
Holiday Inn Rolling Meadows. Special DCC rooms rates are $85 per night.
When making reservations with the hotel, be sure to indicate you are
attending the ARRL and TAPR DCC in order to get the discount. It is highly
recommended that you book your room prior to arriving. A block of 75 rooms
is reserved until August 31, 1998. After the 75 rooms are booked, rooms
will only be available in nearby hotels, so be sure to book your rooms
early! The hotel provides transportation to and from O'Hare Airport.
Please contact the hotel to arrange specific transportation needs.

   Holiday Inn Rolling Meadows (conference hotel)
   3405 Algonquin Rd
   Rolling Meadows, IL 60008
   Phone 847-259-5000, fax 847-259-0597

Registration

Contact the TAPR office by phone, fax, or e-mail (numbers and addresses are
above) to register or for additional meeting information. MasterCard and
VISA are accepted.

- Preregistration (before Sept 1): $42.00 *

- Late registration or at door: $47.00 *

* - Conference registration includes Conference Proceedings, Saturday
sessions/meetings, and lunch.

- Saturday Evening Dinner (limited space): $20.00 **

** - Includes dinner, speaker, prize drawing

Seminar/symposia

Note: You do not have to be registered for the conference to attend one or
more of the seminars/symposia.

- Friday, 1-8 PM, Second Annual APRS National Symposium (full day)

   Registration: $25***

- Friday 3-7 PM, Infrastructure Technologies in Amateur Radio, conducted by
Don Lemke, WB9MJN

   Registration: $15***

Sunday 8:30-11 AM and 11:30 AM-2 PM, RUDAK Future Operations and
Experimentations by Lyle Johnson, WA7GXD, and Packet Radio Networks with
Millions or Billions of Stations by Tim Shepard, KD1KY

   Registration $20***

*** Cost of seminar or symposium includes the cost of handout materials.

Contact TAPR to register for the DCC:

Tucson Amateur Packet Radio
8987-309 E. Tanque Verde Road #337
Tucson, AZ 85749-9399.
phone 940-383-0000, fax 940-566-2544
e-mail tapr@tapr.org, browse http://www.tapr.org

140. Antenna Cables

From: "Pete Prossen" <prossen@znet.com>
Date: Sun, 31 May 1998 18:03:33 -0700
To: "Tapr GPS list server" <tacgps@tapr.org>
Message-ID: <199806010108.SAA07234@sd.znet.com>
Rendered body type: text/plain

As I admired the new Motorola antenna just received, I got to wondering about the 20-ft cable attached to it, and the additional signal path length it adds.

I believe that the center of the antenna patch is the triangulation point for range computation. It is here that the signal paths converge.

An additional path length (20-ft divided by propagation constant for the cable) is then added to each of the signals. Although it is constant for each signal, the true path lengths from SV's to the antenna are probably quite different. Thus the cable contribution alters the true proportionality of the paths.

It seems to me that cable length creates the opportunity for a significant measurement error. And I've seen cables for GPS antennas as long as 60 feet.

I'm sure there is a way to correct for this. For example, the Motorola Oncore has the "1PPS CABLE DELAY" optional parameter. My understanding is that it is used to trim the wick on the 1PPS timing signal output.

Is the same parameter also used for location computations?

And what is done for the personal hand-held units like my Garmin GPS III? Near as I can tell, there is no settable parameter for cable length.

I hope this question doesn't show my ignorance to be any worse than I already know it is.

Pete Prossen

WA6ZUH

prossen@znet.com

June 1998

Original source file: tacgps.9806
Source: http://ftp.tapr.org/product_docs/TAC2/mail_archives/tacgps.9806

1. Re: [TACGPS:1574] Antenna Cables

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Mon, 01 Jun 1998 05:13:59 +0100
To: tacgps@tapr.org
Message-ID: <35722A87.8DF83A72@clark.net>
Rendered body type: text/plain

Pete Prossen wrote:
>
> As I admired the new Motorola antenna just received, I got to wondering
> about the 20-ft cable attached to it, and the additional signal path length
> it adds.
>
> I believe that the center of the antenna patch is the triangulation point
> for range computation. It is here that the signal paths converge.
>
> An additional path length (20-ft divided by propagation constant for the
> cable) is then added to each of the signals. Although it is constant for
> each signal, the true path lengths from SV's to the antenna are probably
> quite different. Thus the cable contribution alters the true
> proportionality of the paths.
>
> It seems to me that cable length creates the opportunity for a significant
> measurement error. And I've seen cables for GPS antennas as long as 60
> feet.
>
> I'm sure there is a way to correct for this. For example, the Motorola
> Oncore has the "1PPS CABLE DELAY" optional parameter. My understanding is
> that it is used to trim the wick on the 1PPS timing signal output.
>
> Is the same parameter also used for location computations?
>
> And what is done for the personal hand-held units like my Garmin GPS III?
> Near as I can tell, there is no settable parameter for cable length.
>
> I hope this question doesn't show my ignorance to be any worse than I
> already know it is.

Pete -- the cable length has ZERO effect on the position determination.
The position you get refers to the phase center of the antenna.

To get a position from your receiver, you measure the time delay between
your receiver's internal clock and each of 4 (or more) satellites. These
4 observations are called pseudoranges (or biased ranges) because they
all have a common error, the receiver's clock. The 4 PRs are then used
to get 3-D position plus the error in the receiver's clock.

Now add 100 meters of cable. If the cable were filled with vaccuum, then
all 4 satellite signals would be delayed an addition 300 nsec (or more
like 450 nsec for real cable with a velocity factor ~0.66). But the SAME
300 (or 450) nsec is added to the PRs for a 4 satellites, so all that is
effected is the clock bias correction.

Putting 100 meters of cable in the antenna line, or in the output of the
1PPS signal has precisely the same effect -- it makes the clock be late.
The cable corrections that can be applied to the ONCORE simply offset the
receiver's clock parameters EARLY by the amount that the cable makes them
be LATE.

Here is an interesting corollary to this. At many trade shows, some group
puts a "community" antenna on the roof, amplifies the signal, and then
re-transmits it inside the building for all the show participants. When
this is done, ALL receivers in the exhibition hall read the same position,
namely that of the rooftop antenna. And when you walk around inside the
exhibition hall, your position doesn't change. The reason is that the
path for all the satellites seen "indoors" have an identical added
constant; the re-radiated indoor path is the equivalent of a long coax
cable. Lots of vendors have been very surprised to learn of this quirky
behavior, even to the point that they have accused rival vendors of jamming
their exhibit!

73, Tom

2. Re: [TACGPS:1574] Antenna Cables

From: Dave Martindale <davem@cs.ubc.ca>
Date: Sun, 31 May 1998 22:31:25 -0700
To: tacgps@tapr.org
Message-ID: <l03130300b197e9d2f39d@[198.162.38.159]>
Rendered body type: text/plain

>An additional path length (20-ft divided by propagation constant for the
>cable) is then added to each of the signals. Although it is constant for
>each signal, the true path lengths from SV's to the antenna are probably
>quite different. Thus the cable contribution alters the true
>proportionality of the paths.
>
>It seems to me that cable length creates the opportunity for a significant
>measurement error. And I've seen cables for GPS antennas as long as 60
>feet.

As it turns out, it doesn't add any position error, at least in the
common case.

The GPS receiver does not have an atomic clock independently
synced to GPS time. Instead, it has a local clock that is roughly
stable in frequency, but with some unknown time offset from GPS time,
and some unknown drift rate.

The process of calculating a 3-dimensional position thus cannot be
done with only 3 satellites (as it could if a local accurate clock was
available). Instead, 4 satellites are used to give 4 independent
measurements, which are then used to solve for 4 unknowns: 3 degrees
of freedom in position, and clock offset. (If more than 4 satellites
are being received, the receiver may use the best 4, or it may
calculate a least-squares or similar fit using all satellites.

In some sense, the solution is arrived at by constructing a set of
spheres surrounding the 4 satellites whose radiuses are the measured
pseudo-ranges to each satellite, and then enlarging or shrinking all
4 spheres by the same amount at the same time until they intersect
(or come as close as possible to intersecting). When this happens,
the point of intersection is the antenna location, and the amount you
needed to adjust the pseudo-ranges by to find the intersection is the
error in the pseudo-ranges, which will be assumed to be clock error.

Now, if you add (say) 20 ns of delay to the signal from every satellite,
you will get a slightly different solution. But the solution you get
will give the *same* position as before, with a clock error calculation
that is 20 ns different before. So the cable delay affects the clock
timing, but not position.

>I'm sure there is a way to correct for this. For example, the Motorola
>Oncore has the "1PPS CABLE DELAY" optional parameter. My understanding is
>that it is used to trim the wick on the 1PPS timing signal output.
>
>Is the same parameter also used for location computations?

If you only care about position, you can ignore cable delay. If you care
about relative timing (e.g. using the TAC to discipline a TOC), you also
don't care about cable delay. But if you care about absolute time (TAC
used to synchronize clocks in different places) then you do care about
the cable delay. The Oncore receiver allows you to "advance" the timing of
the output pulse to compensate for cable delay. But the position is
unaffected by it.

>And what is done for the personal hand-held units like my Garmin GPS III?
>Near as I can tell, there is no settable parameter for cable length.

No, and it doesn't provide precise timing anyway. There is no 1 PPS
output, and the time in the NMEA output may be a second or two behind
the true time.

The absence is more serious in a receiver like the Garmin 25, which *does*
have a 1 PPS output and NMEA data synchronized with it, but no way to
compensate for cable delay.

        Dave

3. Re: [TACGPS:1560] Rhubidium, GPS & Microcontrollers - Steering

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Tue, 02 Jun 1998 01:05:24 -0400

To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980602010524.007e0e10@appstate.campus.mci.net>
Rendered body type: text/plain

Ron,

More thots about not steering the Rube.

>By the way, as I read your discussion it occurred to me that the PIC that I
>am experimenting with (16F84) uses a 10 MHz clock. How convenient! The
>Rube can become the base clock for the PIC and they will, by definition
>always be locked together!

Running the micro from the 10 Mhz clock should be an improvement over the usual (unstable) clock xtal. Here is my thinking.

To start, suppose that the micro runs from its a) own xtal, b) the 10 Mhz Rube is perfectly on freq, c) the GPS produces perfect 1 PPS pulses. The "input capture" on the micro should produce exactly the same number each second. We'll also assume that the Rube count-down is 1/2 second out-of-phase with the GPS, hence a micro with a 2 Mhz bus would generate a count of 1E6. Suppose the cold wind blows thru the window and the xtal on the micro "instantly" changes 1 ppm. This represents 2 counts (i.e. 1 us) over one second duration. The result is that the Rube-GPS time difference changes 1 count (since they are "really" 1/2 second apart). The Rube-GPS being 1/2 sec out-of-phase represents a worst-case as the maximum time difference, since 1 sec pulses can only be +- 1/2 second apart.

When the Rube is "steered," then the Rube-GPS time difference will eventually end up oscillating between +- 1 count of time difference (still assuming that the GPS is perfect). A 1 ppm change in the micro's xtal freq has no appreciable effect. Therefore steering makes the effect of change in the micro's xtal frequency neglible. If the micro's clock is driven from the Rube, then the foregoing problem is eliminated and there would be no need to steer the Rube.

Since the 'E2 version of the HC11 I'm using will not run at 10 Mhz, driving it from the Rube is not feasible. One solution is to phase lock the 8 Mhz xtal to the Rube, but that takes hardware. "Calibrating" the micro to the Rube might handle the situation. The time count between Rube 1 second periods could be used to adjust the time count between the Rube and GPS, thus a chilly wind would only result in the adjustment factor changing. Fortunately, 1 second is enormous amount of time when it comes to computing, so the computation is no problem.

There is also the issue of averaging, or filtering (an average is a crummy low pass filter). Even though the micro's time difference measurement is 1/2 us (HC11 with 2 Mhz bus; the PIC will have somewhat better resolution), the averaging has the effect of increasing the resolution. If the Rube is only very slightly off in frequency then one should see a string of identical Rube-GPS for a very long time before the count changed (still assuming a perfect GPS signal). The real GPS signal has jitter (noise) which has the same effect as the old servo scheme of "dithering." The jitter should have the effect of producing an average that shows the frequency difference between the Rube and GPS to a resolution higher than the 1/2 us, provided the filtering cutoff is low, that is long time period (e.g. longer period that than say, 1/2 hour, to cover the SA cycle).

Finally, thinking of the overkill of using the HC11. The A/D inputs are sitting there unused. Why not monitor the Rube's lock and xtal control voltage. According to the Rube's manual it looks like one long-term problem is the xtal drifting outside the control voltage range.

73's
Don, W4DH

4. GPS horizon plots

From: John Ackermann N8UR <jra@febo.com>
Date: Mon, 01 Jun 1998 21:25:52 -0400
To: tacgps@tapr.org, aprssig@tapr.org
Message-ID: <199806020125.VAA27683@meow.febo.com>
Rendered body type: text/plain

I've been doing a "science fair experiment" to see what the effect of foliage is on GPS signals.

I have a GPS antenna mounted on my tower. There's a patch of woods with tall trees running east-west immediately to the south of the tower, while the horizon to the north is clear down to 10 degrees or so. I used Stan Huntting's "SA Watch" program to plot the satellite

horizon for a seven day period last winter, and again this week. That
gives me one plot with the leaves off the trees, and another when the
foliage is full and moist.

The results aren't quite what I expected. I've put a description of
the experiment, as well as screen-shots of the horizon displays, at
http://www.febo.com/ntp/gps-horizon.html if you're interested.

The third and final phase of the experiment is to replace the ~45 feet
of RG-58 that's currently between the antenna and the GPS receiver with
a piece of 9913 to see what difference 8dB less attenuation makes. I
hope to finish that experiment and post the results in three weeks or
so.

John N8UR
jra@febo.com
http://www.febo.com

5. ONCORE TTFF

From: Garren Davis <g_davis@qlc.com>
Date: Tue, 2 Jun 1998 08:50:49 -0700
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <C02941964DF7D1119B9900805FBB3B7B0AF24C@ntmail.qlc.com>
Rendered body type: text/plain

I have another question about the ONCORE receiver. When I first
powered up the ONCORE and started TAC32 it took about a half
hour to aquire the sats. I figure it did a cold start. I played with it
and let it run for a few days then turned it off because I was going
on vacation. When I powered it back on and started TAC32 it took
about a half hour again to aquire the sats. I thought with the onboard
battery that it would keep the time and date and therefore would
have a faster time to first fix. Is my thinking wrong or am I supposed
to give the ONCORE a command to tell it to remember the settings
or is this the way the ONCORE is suppose to work?
Thanks for the help.

Garren
g_davis@qlc.com

6. RE: [TACGPS:1579] ONCORE TTFF

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Tue, 2 Jun 1998 12:20:11 -0400
To: <tacgps@tapr.org>
Message-ID: <000601bd8e42$50e96260$101161cf@rick.cnssys.com>
Rendered body type: text/plain

Garren,

You should get acquisition much quicker than that after the receiver has an
ephemeris set (15 minutes or so from a cold start if all goes well). TAC32
will tell you if the receiver is acquiring new ephemeris data on the status
line just below the satellite bar graph.

TAC32 re-initializes the Oncore's reference location every time it starts up
so be sure to set the reference location. If you haven't had time to do a
full self-survey, at least do a "Set Reference from Current".

Is this an Oncore VP, UT+ or GT+?

Rick
WB2TNL

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Garren Davis
Sent: Tuesday, June 02, 1998 11:55 AM
To: tacgps@tapr.org
Subject: [TACGPS:1579] ONCORE TTFF

I have another question about the ONCORE receiver. When I first
powered up the ONCORE and started TAC32 it took about a half
hour to aquire the sats. I figure it did a cold start. I played with it
and let it run for a few days then turned it off because I was going
on vacation. When I powered it back on and started TAC32 it took
about a half hour again to aquire the sats. I thought with the onboard
battery that it would keep the time and date and therefore would

have a faster time to first fix. Is my thinking wrong or am I supposed
to give the ONCORE a command to tell it to remember the settings
or is this the way the ONCORE is suppose to work?
Thanks for the help.

Garren
g_davis@qlc.com

7. RE: [TACGPS:1580] RE: ONCORE TTFF

From: Garren Davis <g_davis@qlc.com>
Date: Tue, 2 Jun 1998 09:49:06 -0700
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <C02941964DF7D1119B9900805FBB3B7B0AF24D@ntmail.qlc.com>
Rendered body type: text/plain

Rick,

When you say "full self-survey" do you mean let TAC32 run for a while and
let it
average the posistion? If so then yes I have done that and set that as the
reference
location. I don't remember if the status line said "acquiring new ephemeris
data"
or some other message. I will try it again tonight when I get home. It seems
to
acquire much faster when I run the Motorola program that came with the
ONCORE VP.
Anyway, thanks for the quick response. I'll try a few things tonight and let
you know.

Garren

> ----------
> From: Richard M. Hambly[SMTP:rick@cnssys.com]
> Reply To: tacgps@tapr.org
> Sent: Tuesday, June 02, 1998 9:23 AM
> To: tacgps@tapr.org
> Subject: [TACGPS:1580] RE: ONCORE TTFF
>
> Garren,
>
> You should get acquisition much quicker than that after the receiver has
> an
> ephemeris set (15 minutes or so from a cold start if all goes well).
> TAC32
> will tell you if the receiver is acquiring new ephemeris data on the
> status
> line just below the satellite bar graph.
>
> TAC32 re-initializes the Oncore's reference location every time it starts
> up
> so be sure to set the reference location. If you haven't had time to do a
> full self-survey, at least do a "Set Reference from Current".
>
> Is this an Oncore VP, UT+ or GT+?
>
> Rick
> WB2TNL
>
> -----Original Message-----
> From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Garren Davis
> Sent: Tuesday, June 02, 1998 11:55 AM
> To: tacgps@tapr.org
> Subject: [TACGPS:1579] ONCORE TTFF
>
>
>
>
>
> I have another question about the ONCORE receiver. When I first
> powered up the ONCORE and started TAC32 it took about a half
> hour to aquire the sats. I figure it did a cold start. I played with it
> and let it run for a few days then turned it off because I was going
> on vacation. When I powered it back on and started TAC32 it took
> about a half hour again to aquire the sats. I thought with the onboard
> battery that it would keep the time and date and therefore would
> have a faster time to first fix. Is my thinking wrong or am I supposed
> to give the ONCORE a command to tell it to remember the settings
> or is this the way the ONCORE is suppose to work?
> Thanks for the help.

>
> Garren
> g_davis@qlc.com
>

8. Re: [TACGPS:1579] ONCORE TTFF

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Tue, 02 Jun 1998 13:44:46 -0400
To: tacgps@tapr.org
Message-ID: <35743A0E.4CD0FFCF@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Garren Davis wrote:
>
> I have another question about the ONCORE receiver. When I first
> powered up the ONCORE and started TAC32 it took about a half
> hour to aquire the sats. I figure it did a cold start. I played with it
> and let it run for a few days then turned it off because I was going
> on vacation. When I powered it back on and started TAC32 it took
> about a half hour again to aquire the sats. I thought with the onboard
> battery that it would keep the time and date and therefore would
> have a faster time to first fix. Is my thinking wrong or am I supposed
> to give the ONCORE a command to tell it to remember the settings
> or is this the way the ONCORE is suppose to work?

I agree with Rick's comments -- make sure you are not resetting the
receiver position. You can see this in the positions window on the main
TAC32 screen.

A few other factoids: Yes, the purpose of the battery is to keep the
on-board clock running so that the receiver "wakes up" knowing the
approximate time. There are two other pieces of information it needs
to do a "smart start" -- it needs an almanac with Keplerian elements
so that it knows which GPS satellites are visible, and it needs to
know where you are located. These 3 pieces of information lets your
receiver know which satellites to look for.

When you power up the receiver, it starts searching for visible
satellites by searching the 1023 possible phases of the C/A code
for the particular satellite, and by searching in RF frequency based
on its predicted Doppler offset. Once the receiver gets code/freq
lock, it starts looking for the beginning of the 1500 bit long
data message sent at 50 bits/sec -- i.e. beginning every 30 secs.
You may have started this step at any time, so the maximum should
be 30 sec, minimum zero, and average 15 secs. Finding this boundary
lets the rcvr set its clock to a few msec, and it lets it start
reading the 1500 bit message. After another 30 secs elapse (assuming
there were no dropouts), the receiver has the entire 1500 bit message
wnich contains all the information needed to use this satellite's
data, including a precise set of orbital elements (ephemeris). When
4 satellites are thus found, the receiver can do a position fix.
If the 3 assumptions -- approx time+approx location+almanac known --
are true and signals are solid, the acquisition time should be 30-60
seconds.

If you have been locked up, kill the power, and then re-power the
receiver, the acquisition time will be faster because the receiver
already knows all the ephemeris & status info. This data is changed
a couple of times per day; its validity is tested by a "serial number"
called the IODE (Issue of Data Ephemeris) contained in the 1500 bit
message.

Now lets consider the situation when one of the three assumptions is
not valid. Rick suggested that you make sure that TAC32 knows your
approximate position, and TAC32 resets the receiver's location to its
software default value. If the default is grossly wrong, the receiver
will be looking at the wrong satellites!

In case you have done a cold reset of the receiver, the almanac data
will be missing. Each GPS satellite sends down the almanac for the
entire constellation in its 1500 bit message. Unfortunately, it takes
25 cycles to send all the information (i.e. 12.5 minutes) to reload
the receiver's almanac replica.

Different receivers handle the coldstart condition differently. In
most cases, it they see that the clock has stopped, or that no almanac
is loaded, they immediately start a "blind" search for satellites.
If your receiver has a bogus position and doesn't lock onto some
satellites in a few minutes, this also triggers an all-sky, blind

search. Since there are 32 possible GPS satellite PRNs, and the ONCORE
has only 8 channels, it can only try "tuning in" on a quarter of the
possible satellites at a time. It sounds like this is what's happening
to you.

73, Tom

9. SAWatch

From: mpetz@ccm.stlcc.cc.mo.us (Micheal Petz)
Date: Tue, 2 Jun 1998 15:36:23 -0500
To: tacgps@tapr.org
Message-ID: <2.2.16.19980602153345.57cff196@ccm.stlcc.cc.mo.us>
Rendered body type: text/plain

I recently download the most current SAWatch to calibrate my
position for TAPR DGPS. When I went to select the receiver type, the label
for the Oncore w/ DGPS was "grayed out'. Did I get a bad load, this feature
not enabled yet, or do I need to register this software to enable this option?
        Also, when I connected (and re-configured) my Garmin 45XL to the
computer instead of the Oncore w/ DGPS, it will run for about 10 hours and
then give me a "run time error #13" and die. Can anyone tell me what this
error is (and if possible, how to fix it!).
        Thanks in advance!

        Michael Petz
        KA9HNT
        mpetz@ccm.stlcc.cc.mo.us

10. literature on gps in urban canyons

From: Garwood745@aol.com
Date: Tue, 2 Jun 1998 21:13:05 EDT
To: tacgps@tapr.org
Message-ID: <e24f8810.3574a323@aol.com>
Rendered body type: text/plain

Any pointers to information on the effect of urban canyons on gps performance?

garywoodward

11. antenna design needed

From: Bryan Mumford <bryan@bmumford.com>
Date: Tue, 2 Jun 1998 18:43:06 -0800
To: tacgps@tapr.org
Message-ID: <v0300780eb19a661156ce@[207.71.218.211]>
Rendered body type: text/plain

I'm using a GPS-20 to generate 1 pps signals that are used to track the
drift in precision pendulum clocks. The GPS-20 is tethered to an outdoor
antenna, but many of the clocks are in other rooms. I would like to
distribute 1 pps signals through the building. I would most like to do this
with a simple radio transmitter and a mobile receiver that can be moved
from clock to clock. For a low cost homebrew approach I'd like to try using
a PIC chip to drive an antenna at about 500 KHz, and detect this tone, but
I know nothing about matching the impedance of a digital bit to an antenna.
Can anyone advise me on how to approach this?

I understand that I will lose some precision in the 1 pps signal, but our
measurements are long term and a little scatter that doesn't accumulate is
affordable.

Bryan Mumford
Santa Barbara, California
http://www.bmumford.com

12. DGPS through Digipeaters

From: Doug Bade <doug@clecom.com>
Date: Wed, 03 Jun 1998 00:01:32 -0400
To: tacgps@tapr.org
Message-ID: <3.0.32.19980603000126.0083a390@en.com>
Rendered body type: text/plain

Hello All at Sig ;
        I have set up my DGPSIB at my office on 144.39, I am transmitting about
every 12 seconds or so.. I set up unproto path through 1 digi, my house,
kb8gvq,and started tracking differential.. I found that my Garmin 65 looses
rtcm input more than I thought it should, seems that it doesn't really like
the direct and digi'd signal when in a capture area of the two
(sequentially). seems to get data failures alot in this mode. I bought a

Garmin GPS 111 to see if the parralel tracker would handle it better..
EPE's got real good, 50 ft or less, altitude really settled down.. but....
still drops lock unexpectedly.. Does digi'ing have a noticeable effect on
garmins??? I have no experience with differential beyond DGPSIB..
        As for traffic loading, even at 10 seconds, I have not seen backlogs in
our area at this time.. (of traffic)... I do not know how far I am
transmitting my DGPS signal, but I would like to digi through a high
profile site nearby..
but..... Is this an ok Idea ??? does redundent reception of an rtcm packet
mess with receivers??? any Ideas???? TNX in advance.... From Cleveland,
                                                        Doug   KB8GVQ

13. Re: [TACGPS:1586] DGPS through Digipeaters

From: Bob Bruninga <bruninga@nadn.navy.mil>
Date: Wed, 3 Jun 1998 00:36:04 -0400 (EDT)
To: tacgps@tapr.org
Message-ID: <Pine.SOL.3.96.980603002251.25216C-100000@arctic>
Rendered body type: text/plain

On Tue, 2 Jun 1998, Doug Bade wrote:

>   I have set up my DGPSIB at my office on 144.39, I am transmitting about
> every 12 seconds or so.. I set up unproto path through 1 digi...
> .... As for traffic loading, even at 10 seconds, I have not seen
> backlogs in our area at this time.. (of traffic)...

Big missunderstanding of APRS here. There is no such thing as a "backlog"
since APRS is a connectionless system. Packets in a colision are lost
forever. Since base stations are transmitting only once every 30 minutes,
each such lost packet, knocks someone out of activity for an hour. At 10
seconds, plus digipeating, you are consuming 20% of channel capacity. In
an Aloha system, scuh as APRS, the maximum theoretical throughput of such
a channel is only 18%. Therefore your loading is consuming all of the
usable capacity... depending on how you look at it.

I would say that the only way to be fair to users on the channel is to do
either of two mitigations:

1) Operate without digipeating. This requires you to place your DGPS
equipment AT THE DIGIPEATER or very high site. This way it CAN HEAR other
users before it rransmits and thereby avoid collisions.

2) Operate through a digipeater, but run absolutely the minimum possible
power level, so that your signal arrives at the digi just above threshold.
This way, your signal will not block other users during a colision. This
is only a modest solution, however, due to the 10 dB capture effect. Even
at threshold, other stations will have to have 10 times more power to win
a collision. So in effect, you are placing a 10 dB penalty on everyone
else.

Good luck. :-)
Bob WB4APR

14. Re: [TACGPS:1583] SAWatch

From: Gary Sanders <gsanders@gte.net>
Date: Tue, 02 Jun 1998 23:35:08 -0400
To: tacgps@tapr.org
Message-ID: <3574C46C.14663970@gte.net>
Rendered body type: text/plain

Micheal,

Your best be would be to send an email to Stan Huntting (the author
of SA Watch) at:

stan@csn.net

Hopefully he should be able to help you pretty quickly.

Gary Sanders

Micheal Petz wrote:
>
>   I recently download the most current SAWatch to calibrate my
> position for TAPR DGPS. When I went to select the receiver type, the label
> for the Oncore w/ DGPS was "grayed out'. Did I get a bad load,

15. Re: [TACGPS:1585] antenna design needed

From: Steve Bennett <swben@ricochet.net>
Date: Tue, 02 Jun 1998 23:48:59 -0700
To: tacgps@tapr.org
Message-ID: <3574F1DB.73DD@ricochet.net>
Rendered body type: text/plain

Howdy

Looking for a cheap and easy RF link to distribute 1PPS beeps around
the house?   A simple way to send a 1PPS tone would be to use a "baby
room monitor" set next to your computer. Run showtime or tac-32 with the
beeps on and you should be able to hear them on the recever throughout
the house. A "baby room monitor " can be had for $20 to $40 at the
local discount toy store.

Have Fun

Steve Bennett

Bryan Mumford wrote:
>
> I'm using a GPS-20 to generate 1 pps signals that are used to track the
> drift in precision pendulum clocks. The GPS-20 is tethered to an outdoor
> antenna, but many of the clocks are in other rooms. I would like to
> distribute 1 pps signals through the building. I would most like to do this
> with a simple radio transmitter and a mobile receiver that can be moved
> from clock to clock. For a low cost homebrew approach I'd like to try using
> a PIC chip to drive an antenna at about 500 KHz, and detect this tone, but
> I know nothing about matching the impedance of a digital bit to an antenna.
> Can anyone advise me on how to approach this?
>
> I understand that I will lose some precision in the 1 pps signal, but our
> measurements are long term and a little scatter that doesn't accumulate is
> affordable.
>
> Bryan Mumford
> Santa Barbara, California
> http://www.bmumford.com

16. Re: [TACGPS:1587] Re: DGPS through Digipeaters

From: Steve Sampson <ssampson@usa-site.net>
Date: Wed, 3 Jun 1998 06:46:57 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199806031146.GAA30894@access.usa-site.net>
Rendered body type: text/plain

So basically the APRS system is based on a prayer?

There was an earlier thread where some were counseled for not "just
trying it" and not basing their decision on mere theory.

My own personal feelings, is that DGPS on the APRS freq is a non-starter.
It could be a starter, but only if you get rid of AX25. That is, go to
an FEC system where reliable data (non-prayer) is the goal.

What is the APRS consensus about modernization? Could TAPR be used to
distrubute a more modern modem? or, is 1.2 kbps AX25 the end of the road?
I'm thinking RS-232 to a black box with a spot for an internal GPS engine.
4.8 kbps speed seems overkill, while 1.2 kbps has proven too limiting.

One of the things I do for local Hams, is to link their DX cluster to the
main hub. I'm often thinking their user interface could be improved with
something like the APRS one. That is, DX shows up as a point, and the user
gets a bearing and range as he moves the mouse over it, etc, etc. But
combining this, with current APRS users requires a dB more of speed [sic].

Steve

> >   I have set up my DGPSIB at my office on 144.39, I am transmitting about
> > every 12 seconds or so.. I set up unproto path through 1 digi...
> > .... As for traffic loading, even at 10 seconds, I have not seen
> > backlogs in our area at this time.. (of traffic)...
>
> Big missunderstanding of APRS here. There is no such thing as a "backlog"
> since APRS is a connectionless system. Packets in a colision are lost
> forever. Since base stations are transmitting only once every 30 minutes,
> each such lost packet, knocks someone out of activity for an hour. At 10
> seconds, plus digipeating, you are consuming 20% of channel capacity. In

> an Aloha system, scuh as APRS, the maximum theoretical throughput of such
> a channel is only 18%. Therefore your loading is consuming all of the
> usable capacity... depending on how you look at it.

17. RE: [TACGPS:1582] Re: ONCORE TTFF

From: Garren Davis <g_davis@qlc.com>
Date: Wed, 3 Jun 1998 07:58:31 -0700
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <C02941964DF7D1119B9900805FBB3B7B0AF24E@ntmail.qlc.com>
Rendered body type: text/plain

I had a chance to play with the ONCORE VP and the TAC32 software
last night. It seems to take a long time to acquire the sats after a power
up because the TAC32 software uses the local PC time instead of the
UTC time when it tells the ONCORE where it is and what time it is.

If I set my PC clock to UTC time then start TAC32 it acquires the sats
very quickly. Is there some UTC correction I am supposed to use in the
TAC32 software?

Garren
> ----------
> From: Dr Thomas A Clark (W3IWI)[SMTP:clark@tomcat.gsfc.nasa.gov]
> Reply To: tacgps@tapr.org
> Sent: Tuesday, June 02, 1998 10:48 AM
> To: tacgps@tapr.org
> Subject: [TACGPS:1582] Re: ONCORE TTFF
>
> Garren Davis wrote:
> >
> > I have another question about the ONCORE receiver. When I first
> > powered up the ONCORE and started TAC32 it took about a half
> > hour to aquire the sats. I figure it did a cold start. I played with it
> > and let it run for a few days then turned it off because I was going
> > on vacation. When I powered it back on and started TAC32 it took
> > about a half hour again to aquire the sats. I thought with the onboard
> > battery that it would keep the time and date and therefore would
> > have a faster time to first fix. Is my thinking wrong or am I supposed
> > to give the ONCORE a command to tell it to remember the settings
> > or is this the way the ONCORE is suppose to work?
>
> I agree with Rick's comments -- make sure you are not resetting the
> receiver position. You can see this in the positions window on the main
> TAC32 screen.
>
> A few other factoids: Yes, the purpose of the battery is to keep the
> on-board clock running so that the receiver "wakes up" knowing the
> approximate time. There are two other pieces of information it needs
> to do a "smart start" -- it needs an almanac with Keplerian elements
> so that it knows which GPS satellites are visible, and it needs to
> know where you are located. These 3 pieces of information lets your
> receiver know which satellites to look for.
>
> When you power up the receiver, it starts searching for visible
> satellites by searching the 1023 possible phases of the C/A code
> for the particular satellite, and by searching in RF frequency based
> on its predicted Doppler offset. Once the receiver gets code/freq
> lock, it starts looking for the beginning of the 1500 bit long
> data message sent at 50 bits/sec -- i.e. beginning every 30 secs.
> You may have started this step at any time, so the maximum should
> be 30 sec, minimum zero, and average 15 secs. Finding this boundary
> lets the rcvr set its clock to a few msec, and it lets it start
> reading the 1500 bit message. After another 30 secs elapse (assuming
> there were no dropouts), the receiver has the entire 1500 bit message
> wnich contains all the information needed to use this satellite's
> data, including a precise set of orbital elements (ephemeris). When
> 4 satellites are thus found, the receiver can do a position fix.
> If the 3 assumptions -- approx time+approx location+almanac known --
> are true and signals are solid, the acquisition time should be 30-60
> seconds.
>
> If you have been locked up, kill the power, and then re-power the
> receiver, the acquisition time will be faster because the receiver
> already knows all the ephemeris & status info. This data is changed
> a couple of times per day; its validity is tested by a "serial number"
> called the IODE (Issue of Data Ephemeris) contained in the 1500 bit
> message.
>
> Now lets consider the situation when one of the three assumptions is

> not valid. Rick suggested that you make sure that TAC32 knows your
> approximate position, and TAC32 resets the receiver's location to its
> software default value. If the default is grossly wrong, the receiver
> will be looking at the wrong satellites!
>
> In case you have done a cold reset of the receiver, the almanac data
> will be missing. Each GPS satellite sends down the almanac for the
> entire constellation in its 1500 bit message. Unfortunately, it takes
> 25 cycles to send all the information (i.e. 12.5 minutes) to reload
> the receiver's almanac replica.
>
> Different receivers handle the coldstart condition differently. In
> most cases, it they see that the clock has stopped, or that no almanac
> is loaded, they immediately start a "blind" search for satellites.
> If your receiver has a bogus position and doesn't lock onto some
> satellites in a few minutes, this also triggers an all-sky, blind
> search. Since there are 32 possible GPS satellite PRNs, and the ONCORE
> has only 8 channels, it can only try "tuning in" on a quarter of the
> possible satellites at a time. It sounds like this is what's happening
> to you.
>
> 73, Tom
>

18. RE: [TACGPS:1591] Re: ONCORE TTFF

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Wed, 3 Jun 1998 12:13:43 -0400
To: <tacgps@tapr.org>
Message-ID: <000701bd8f0a$948dae40$101161cf@rick.cnssys.com>
Rendered body type: text/plain

Garren,

Yes and no. TAC32 works with any time you set your PC to so long as you
also set your PC's time zone to match. For Win95/98 double click on the
time in the lower right corner of your main screen (not TAC32). This brings
up the system clock. Click on the Time Zone tag, set your time zone and be
sure Automatically adjust clock for daylight savings is checked. This way
TAC32 always knows what UTC is and your PC can use local time.

Rick
WB2TNL

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Garren Davis
Sent: Wednesday, June 03, 1998 11:02 AM
To: tacgps@tapr.org
Subject: [TACGPS:1591] Re: ONCORE TTFF

I had a chance to play with the ONCORE VP and the TAC32 software
last night. It seems to take a long time to acquire the sats after a power
up because the TAC32 software uses the local PC time instead of the
UTC time when it tells the ONCORE where it is and what time it is.

If I set my PC clock to UTC time then start TAC32 it acquires the sats
very quickly. Is there some UTC correction I am supposed to use in the
TAC32 software?

Garren
> ----------
> From: Dr Thomas A Clark (W3IWI)[SMTP:clark@tomcat.gsfc.nasa.gov]
> Reply To: tacgps@tapr.org
> Sent: Tuesday, June 02, 1998 10:48 AM
> To: tacgps@tapr.org
> Subject: [TACGPS:1582] Re: ONCORE TTFF
>
> Garren Davis wrote:
> >
> > I have another question about the ONCORE receiver. When I first
> > powered up the ONCORE and started TAC32 it took about a half
> > hour to aquire the sats. I figure it did a cold start. I played with it
> > and let it run for a few days then turned it off because I was going
> > on vacation. When I powered it back on and started TAC32 it took
> > about a half hour again to aquire the sats. I thought with the onboard
> > battery that it would keep the time and date and therefore would
> > have a faster time to first fix. Is my thinking wrong or am I supposed

> > to give the ONCORE a command to tell it to remember the settings
> > or is this the way the ONCORE is suppose to work?
>
> I agree with Rick's comments -- make sure you are not resetting the
> receiver position. You can see this in the positions window on the main
> TAC32 screen.
>
> A few other factoids: Yes, the purpose of the battery is to keep the
> on-board clock running so that the receiver "wakes up" knowing the
> approximate time. There are two other pieces of information it needs
> to do a "smart start" -- it needs an almanac with Keplerian elements
> so that it knows which GPS satellites are visible, and it needs to
> know where you are located. These 3 pieces of information lets your
> receiver know which satellites to look for.
>
> When you power up the receiver, it starts searching for visible
> satellites by searching the 1023 possible phases of the C/A code
> for the particular satellite, and by searching in RF frequency based
> on its predicted Doppler offset. Once the receiver gets code/freq
> lock, it starts looking for the beginning of the 1500 bit long
> data message sent at 50 bits/sec -- i.e. beginning every 30 secs.
> You may have started this step at any time, so the maximum should
> be 30 sec, minimum zero, and average 15 secs. Finding this boundary
> lets the rcvr set its clock to a few msec, and it lets it start
> reading the 1500 bit message. After another 30 secs elapse (assuming
> there were no dropouts), the receiver has the entire 1500 bit message
> wnich contains all the information needed to use this satellite's
> data, including a precise set of orbital elements (ephemeris). When
> 4 satellites are thus found, the receiver can do a position fix.
> If the 3 assumptions -- approx time+approx location+almanac known --
> are true and signals are solid, the acquisition time should be 30-60
> seconds.
>
> If you have been locked up, kill the power, and then re-power the
> receiver, the acquisition time will be faster because the receiver
> already knows all the ephemeris & status info. This data is changed
> a couple of times per day; its validity is tested by a "serial number"
> called the IODE (Issue of Data Ephemeris) contained in the 1500 bit
> message.
>
> Now lets consider the situation when one of the three assumptions is
> not valid. Rick suggested that you make sure that TAC32 knows your
> approximate position, and TAC32 resets the receiver's location to its
> software default value. If the default is grossly wrong, the receiver
> will be looking at the wrong satellites!
>
> In case you have done a cold reset of the receiver, the almanac data
> will be missing. Each GPS satellite sends down the almanac for the
> entire constellation in its 1500 bit message. Unfortunately, it takes
> 25 cycles to send all the information (i.e. 12.5 minutes) to reload
> the receiver's almanac replica.
>
> Different receivers handle the coldstart condition differently. In
> most cases, it they see that the clock has stopped, or that no almanac
> is loaded, they immediately start a "blind" search for satellites.
> If your receiver has a bogus position and doesn't lock onto some
> satellites in a few minutes, this also triggers an all-sky, blind
> search. Since there are 32 possible GPS satellite PRNs, and the ONCORE
> has only 8 channels, it can only try "tuning in" on a quarter of the
> possible satellites at a time. It sounds like this is what's happening
> to you.
>
> 73, Tom
>

19. Re: [TACGPS:1589] Re: antenna design needed

From: Bryan Mumford <bryan@bmumford.com>
Date: Wed, 3 Jun 1998 09:16:12 -0800
To: tacgps@tapr.org
Message-ID: <v03007804b19b347811d0@[207.71.222.178]>
Rendered body type: text/plain

>A simple way to send a 1PPS tone would be to use a "baby
>room monitor" ...

Thanks for the tip. Not to be ungrateful, but I was hoping for a faster
response than tone decoding an audio burst, which is sure to introduce an
uncertainty of several milliseconds.

Bryan Mumford
Santa Barbara, California
http://www.bmumford.com

20. RE: [TACGPS:1592] Re: ONCORE TTFF

From: Garren Davis <g_davis@qlc.com>
Date: Wed, 3 Jun 1998 09:55:02 -0700
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <C02941964DF7D1119B9900805FBB3B7B0AF24F@ntmail.qlc.com>
Rendered body type: text/plain

Rick,

Thanks for the explaination. I can't imagine my time zone being wrong
but stranger things have happened. I'll check it tonight after work.

Garren

> ----------
> From: Richard M. Hambly[SMTP:rick@cnssys.com]
> Reply To: tacgps@tapr.org
> Sent: Wednesday, June 03, 1998 9:20 AM
> To: tacgps@tapr.org
> Subject: [TACGPS:1592] Re: ONCORE TTFF
>
> Garren,
>
> Yes and no. TAC32 works with any time you set your PC to so long as you
> also set your PC's time zone to match. For Win95/98 double click on the
> time in the lower right corner of your main screen (not TAC32). This
> brings
> up the system clock. Click on the Time Zone tag, set your time zone and
> be
> sure Automatically adjust clock for daylight savings is checked. This way
> TAC32 always knows what UTC is and your PC can use local time.
>
> Rick
> WB2TNL
>
>

21. Re: [TACGPS:1593] Re: antenna design needed

From: chrise@n0jcf.com (Chris Elmquist)
Date: Wed, 3 Jun 1998 12:08:55 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <m0yhH1z-000UOEC@n0jcf.com>
Rendered body type: text/plain

Bryan Mumford wrote:
>
> >A simple way to send a 1PPS tone would be to use a "baby
> >room monitor" ...
>
> Thanks for the tip. Not to be ungrateful, but I was hoping for a faster
> response than tone decoding an audio burst, which is sure to introduce an
> uncertainty of several milliseconds.

You might consider some of the Part15 "garage door opener" transmitter/
receiver devices now readily available. There are lots of ads in
magazines such as Circuit Cellar and Nuts and Volts for these units.
They run on 318, 418, 433 and some on 915 MHz and use SAW resonators
to determine their operating frequency.

Most are set up to directly accept a TTL level signal at the transmitter
and deliver the same signal out the receiver at up to roughly 20Kbps.
You should be able to feed the 1PPS signal right in at this point
and pull it off the receiver the same way. They use ASK modulation
in most cases while some of the 915 MHz units use FSK.

ABACOM, RFLink, and Parallax (the BASIC Stamp people) are offering
these things in small quantities.

You would have to determine the latency by experiment I think.

73, Chris
--
Chris Elmquist, N0JCF
chrise@n0jcf.com

22. Re: [TACGPS:1590] Re: DGPS through Digipeaters

From: Bob Bruninga <bruninga@nadn.navy.mil>
Date: Wed, 3 Jun 1998 13:22:03 -0400 (EDT)
To: tacgps@tapr.org
Message-ID: <Pine.SOL.3.96.980603131919.23756F-100000@arctic>
Rendered body type: text/plain

On Wed, 3 Jun 1998, Steve Sampson wrote:

> One of the things I do for local Hams, is to link their DX cluster to the
> main hub. I'm often thinking their user interface could be improved with
> something like the APRS one. That is, DX shows up as a point, and the user
> gets a bearing and range as he moves the mouse over it, etc, etc.

APRS has a DX cluster mode and can be used to monitor a DX cluster
frequency. APRS will plot all SPOTS on its maps as well as plot any
station that does a SHOW STATION command to the DX cluster. It also
captures the MAIL list so that even without logging on to the DX cluster,
your APRS shows you what all the DX cluster traffic is. Unfortunately
this is now only in the program APRSdx.exe, since it had to be removed
from standard APRSdos to make room. There are DX cluster modes in Mac and
WinAPRS I think also...

23. Re: [TACGPS:1591] Re: ONCORE TTFF

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Wed, 03 Jun 1998 13:49:17 -0400
To: tacgps@tapr.org
Message-ID: <35758C9D.956624BE@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Garren Davis wrote:
>
> I had a chance to play with the ONCORE VP and the TAC32 software
> last night. It seems to take a long time to acquire the sats after a power
> up because the TAC32 software uses the local PC time instead of the
> UTC time when it tells the ONCORE where it is and what time it is.
>
> If I set my PC clock to UTC time then start TAC32 it acquires the sats
> very quickly. Is there some UTC correction I am supposed to use in the
> TAC32 software?

Garren -- a comment on your dialog with Rick. I believe that the
ONCORE's microprocessor has some power-on logic that asks the
question "Has the battery-powered clock been running since the
last time we got a GPS fix?". If the answer is YES, then the
receiver assumes that the clock is approximately correct for the
purpose of doing an initial search.

This test will fail if there is no battery present, or if the
battery has run-down, or if the software "reset all" command
(@@Cf in Motorola's Binary protocol) has been issued. You said
that you have a battery, and I doubt that you have issued an
@@Cf command, so I suggest that the battery may be discharged!

I'm not sure if Rick sends the "Time is now" (@@Aa) and Date
(@@Ac) commands as TAC32 starts up or not. My old SHOWTIME code
allowed the commands to be sent only on user request. However if
the @@Aa and @@Ac commands are sent, they are used by the ONCORE
only if no satellite lock has occurred. The current time from the
1500 bit message I described yesterday takes precedence over
the Time/Date commands sent by the computer.

You say it takes ~30 minutes to lock up. If your ONCORE is like
any of the others I've seen, and if you apply power for ~10
minutes before you run TAC32, the satellites will have already
locked enough to have them provided correct time, and even if
TAC32 sent a bogus value, it would be ignored.

Tom

24. I may have made a mistake! :-)

From: "Michael St. Laurent" <rowl@earthlink.net>
Date: Wed, 03 Jun 1998 15:20:42 -0700
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980603152042.0096ed20@mail.earthlink.net>
Rendered body type: text/plain

I had my TAC-2 all together and working. It was plugged in and data was
being received by happy applications. I sat down to put the lid on the

metal case and ZAP! I got a mild shock from static discharge. Suddenly,
the applications were no longer happy because they had stopped receiving
their data. I opened the case again to see if I had pulled a wire loose or
something but it all looked OK. The LED was still blinking though so I
knew the GPS board was still working.

Now I am wondering if perhaps the static discharge may have burned out the
ICs on the TAC-2 board. Does anyone think this is likely? If so what
should I do to keep this from happening again? I'm pretty new to
electronics so be gentle please! :-)

Michael St. Laurent
Hartwell Corporation

"Whenever you find yourself on the side of the majority
it is time to pause and reflect."
               -- Mark Twain

25. Re: [TACGPS:1598] I may have made a mistake! :-)

From: "Ira A. Wilner" <bdcst@vermontel.com>
Date: Wed, 03 Jun 1998 22:14:47 -0400
To: tacgps@tapr.org, rowl@earthlink.net
Message-ID: <35760317.ED02AFB2@vermontel.com>
Rendered body type: text/plain

Michael St. Laurent wrote:
>
> I had my TAC-2 all together and working. It was plugged in and data was
> being received by happy applications. I sat down to put the lid on the
> metal case and ZAP! I got a mild shock from static discharge. Suddenly,
> the applications were no longer happy because they had stopped receiving
> their data. I opened the case again to see if I had pulled a wire loose or
> something but it all looked OK. The LED was still blinking though so I
> knew the GPS board was still working.
>
> Now I am wondering if perhaps the static discharge may have burned out the
> ICs on the TAC-2 board. Does anyone think this is likely? If so what
> should I do to keep this from happening again? I'm pretty new to
> electronics so be gentle please! :-)

Michael,

When dealing with computers and static or transient events, always try
cold rebooting first. Noise can cause all sorts of unpredictable
behavior.

RS-232 interface chips can be damaged by voltage surges. You might have
zapped a chip in your TAC-2 interface or the serial port of your host
PC! Try a different PC with a known working serial port. Or plug a
modem or other known working serial device into your PC to test its
port. If the PC is okay, then the TAC-2's serial port might be bad or
the GPS module might have switched into a different I/O mode.

An oscilloscope would make it easy to find the culprit.

Prevent surge damage by doing the following:

1) Do not open enclosures when equipment is powered.

2) Properly ground metallic cases to provide an alternate surge current
drain to the port cabling.

3) Develop the habit of grounding yourself before touching electronic
equipment or use a wrist strap when working with logic IC's or other
sensitive electronics. Vaccuum tubes don't mind static electricity,
semiconductors do!

4) Wear clothing with low ESD characteristics, cotton rather than wool
or synthetics. Go barefoot rather than wearing shoes with soles that
tend to generate charge. :-) (Of course, if you are going to ground
your feet, be sure to keep the rest of your body away form sources of
electrical energy.) Ouch!

5) Workspace should not have carpeted floors. (Hardwood is much better.)

6) Use only wooden chairs or those constructed with anti ESD fabrics.

--Ira (W1IRA)

26. A reminder -- Friday Colloquium

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Thu, 04 Jun 1998 06:18:27 +0100
To: TACGPS <tacgps@tapr.org>
Message-ID: <35762E23.4599AC9E@clark.net>
Rendered body type: text/plain

This is a note to remind those of you in the DC area that I'll
be presenting this week's scientific colloquium at the US Naval
Observatory. Rick Hambly is coming and Charlie Heisler said
he may come, so I've left both your names at the USNO Gate.

The colloquium coordinator, Ken Seidelman sent me these
details:

> In the conference room in the correlator building(room 300 of
> Building 52)
> coffee and cookies at 1000, colloquium at 1030,
> lunch at 1200 on 5 June.**

Either gate at USNO can be used -- mention Ken's name if the
guard gives you any problem.

73, Tom

27. RE: [TACGPS:1592] Re: ONCORE TTFF

From: Garren Davis <g_davis@qlc.com>
Date: Thu, 4 Jun 1998 07:25:14 -0700
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <C02941964DF7D1119B9900805FBB3B7B0AF250@ntmail.qlc.com>
Rendered body type: text/plain

Rick,

I checked the time zone on my PC and it was set ok. Is it possible that my
PC
stores the time zone parameter in a different place than other PC's and
TAC32
doesn't know where to find it. Is there a way I can check how my PC sets up
the
time zone? I did notice on other PC's that the time zone display shows a
white
line running through the world map showing where you have the time zone set.

The display of the world map on my PC has no white line so I was wondering
if
maybe my clock operated differently. My PC is a Fujitsu notebook. I have not

been able to try the ONCORE on a different computer yet.

Tom Clark had suggested that it might be a dead keep alive battery but I
checked
the voltage and it was ok.

Thanks again for any insight you can give me.

Garren

> ----------
> From: Richard M. Hambly[SMTP:rick@cnssys.com]
> Reply To: tacgps@tapr.org
> Sent: Wednesday, June 03, 1998 9:20 AM
> To: tacgps@tapr.org
> Subject: [TACGPS:1592] Re: ONCORE TTFF
>
> Garren,
>
> Yes and no. TAC32 works with any time you set your PC to so long as you
> also set your PC's time zone to match. For Win95/98 double click on the
> time in the lower right corner of your main screen (not TAC32). This
> brings
> up the system clock. Click on the Time Zone tag, set your time zone and
> be
> sure Automatically adjust clock for daylight savings is checked. This way
> TAC32 always knows what UTC is and your PC can use local time.
>
> Rick
> WB2TNL

>
> -----Original Message-----
> From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Garren Davis
> Sent: Wednesday, June 03, 1998 11:02 AM
> To: tacgps@tapr.org
> Subject: [TACGPS:1591] Re: ONCORE TTFF
>
>
>
>
> I had a chance to play with the ONCORE VP and the TAC32 software
> last night. It seems to take a long time to acquire the sats after a power
> up because the TAC32 software uses the local PC time instead of the
> UTC time when it tells the ONCORE where it is and what time it is.
>
> If I set my PC clock to UTC time then start TAC32 it acquires the sats
> very quickly. Is there some UTC correction I am supposed to use in the
> TAC32 software?
>
> Garren
> > ----------
> > From: Dr Thomas A Clark (W3IWI)[SMTP:clark@tomcat.gsfc.nasa.gov]
> > Reply To: tacgps@tapr.org
> > Sent: Tuesday, June 02, 1998 10:48 AM
> > To: tacgps@tapr.org
> > Subject: [TACGPS:1582] Re: ONCORE TTFF
> >
> > Garren Davis wrote:
> > >
> > > I have another question about the ONCORE receiver. When I first
> > > powered up the ONCORE and started TAC32 it took about a half
> > > hour to aquire the sats. I figure it did a cold start. I played with
> it
> > > and let it run for a few days then turned it off because I was going
> > > on vacation. When I powered it back on and started TAC32 it took
> > > about a half hour again to aquire the sats. I thought with the onboard
> > > battery that it would keep the time and date and therefore would
> > > have a faster time to first fix. Is my thinking wrong or am I supposed
> > > to give the ONCORE a command to tell it to remember the settings
> > > or is this the way the ONCORE is suppose to work?
> >
> > I agree with Rick's comments -- make sure you are not resetting the
> > receiver position. You can see this in the positions window on the main
> > TAC32 screen.
> >
> > A few other factoids: Yes, the purpose of the battery is to keep the
> > on-board clock running so that the receiver "wakes up" knowing the
> > approximate time. There are two other pieces of information it needs
> > to do a "smart start" -- it needs an almanac with Keplerian elements
> > so that it knows which GPS satellites are visible, and it needs to
> > know where you are located. These 3 pieces of information lets your
> > receiver know which satellites to look for.
> >
> > When you power up the receiver, it starts searching for visible
> > satellites by searching the 1023 possible phases of the C/A code
> > for the particular satellite, and by searching in RF frequency based
> > on its predicted Doppler offset. Once the receiver gets code/freq
> > lock, it starts looking for the beginning of the 1500 bit long
> > data message sent at 50 bits/sec -- i.e. beginning every 30 secs.
> > You may have started this step at any time, so the maximum should
> > be 30 sec, minimum zero, and average 15 secs. Finding this boundary
> > lets the rcvr set its clock to a few msec, and it lets it start
> > reading the 1500 bit message. After another 30 secs elapse (assuming
> > there were no dropouts), the receiver has the entire 1500 bit message
> > wnich contains all the information needed to use this satellite's
> > data, including a precise set of orbital elements (ephemeris). When
> > 4 satellites are thus found, the receiver can do a position fix.
> > If the 3 assumptions -- approx time+approx location+almanac known --
> > are true and signals are solid, the acquisition time should be 30-60
> > seconds.
> >
> > If you have been locked up, kill the power, and then re-power the
> > receiver, the acquisition time will be faster because the receiver
> > already knows all the ephemeris & status info. This data is changed
> > a couple of times per day; its validity is tested by a "serial number"
> > called the IODE (Issue of Data Ephemeris) contained in the 1500 bit
> > message.
> >
> > Now lets consider the situation when one of the three assumptions is

> > not valid. Rick suggested that you make sure that TAC32 knows your
> > approximate position, and TAC32 resets the receiver's location to its
> > software default value. If the default is grossly wrong, the receiver
> > will be looking at the wrong satellites!
> >
> > In case you have done a cold reset of the receiver, the almanac data
> > will be missing. Each GPS satellite sends down the almanac for the
> > entire constellation in its 1500 bit message. Unfortunately, it takes
> > 25 cycles to send all the information (i.e. 12.5 minutes) to reload
> > the receiver's almanac replica.
> >
> > Different receivers handle the coldstart condition differently. In
> > most cases, it they see that the clock has stopped, or that no almanac
> > is loaded, they immediately start a "blind" search for satellites.
> > If your receiver has a bogus position and doesn't lock onto some
> > satellites in a few minutes, this also triggers an all-sky, blind
> > search. Since there are 32 possible GPS satellite PRNs, and the ONCORE
> > has only 8 channels, it can only try "tuning in" on a quarter of the
> > possible satellites at a time. It sounds like this is what's happening
> > to you.
> >
> > 73, Tom
> >
>

28. Re: [TACGPS:1601] Re: ONCORE TTFF

From: Bob Bruninga <bruninga@nadn.navy.mil>
Date: Thu, 4 Jun 1998 11:26:05 -0400 (EDT)
To: tacgps@tapr.org
Message-ID: <Pine.SOL.3.96.980604111549.1640A-100000@arctic>
Rendered body type: text/plain

We just got a SVeeSix-CM GPS from Paccomm and now find out it comes with 0 docs. Just a board in a bag unless you buy the $40 manual that comes with it. So PacComm faxed us some sheets that are contracdictory. It appears that 5v dc goes in on pin 2 and ground is pin 8. And we assume TTL data comes out on 3. Is this NMEA sense (rs232 like mark/space) or is it inverted TTL from NMEA and rs232?

bob

29. RE: [TACGPS:1601] Re: ONCORE TTFF

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Thu, 4 Jun 1998 11:24:39 -0400
To: <tacgps@tapr.org>
Message-ID: <000f01bd8fcc$e4225ec0$101161cf@rick.cnssys.com>
Rendered body type: text/plain

Garren,

Tell me if TAC32's main screen "PC Time" and "UTC Time" boxes have correct data, including time zone information. I will check the TAC32 initialization data here.

Also, have you used another program to set the time zone in the GPS receiver to something other than UTC. TAC32 wants the receiver to stay in UTC time mode, not local time.

Also, the time and position initialization that TAC32 performs should be ignored by the receiver if it is already tracking satellites.

Rick
WB2TNL

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Garren Davis
Sent: Thursday, June 04, 1998 10:35 AM
To: tacgps@tapr.org
Subject: [TACGPS:1601] Re: ONCORE TTFF

Rick,

I checked the time zone on my PC and it was set ok. Is it possible that my PC
stores the time zone parameter in a different place than other PC's and TAC32

doesn't know where to find it. Is there a way I can check how my PC sets up
the
time zone? I did notice on other PC's that the time zone display shows a
white
line running through the world map showing where you have the time zone set.

The display of the world map on my PC has no white line so I was wondering
if
maybe my clock operated differently. My PC is a Fujitsu notebook. I have not

been able to try the ONCORE on a different computer yet.

Tom Clark had suggested that it might be a dead keep alive battery but I
checked
the voltage and it was ok.

Thanks again for any insight you can give me.

Garren

> ----------
> From: Richard M. Hambly[SMTP:rick@cnssys.com]
> Reply To: tacgps@tapr.org
> Sent: Wednesday, June 03, 1998 9:20 AM
> To: tacgps@tapr.org
> Subject: [TACGPS:1592] Re: ONCORE TTFF
>
> Garren,
>
> Yes and no. TAC32 works with any time you set your PC to so long as you
> also set your PC's time zone to match. For Win95/98 double click on the
> time in the lower right corner of your main screen (not TAC32). This
> brings
> up the system clock. Click on the Time Zone tag, set your time zone and
> be
> sure Automatically adjust clock for daylight savings is checked. This way
> TAC32 always knows what UTC is and your PC can use local time.
>
> Rick
> WB2TNL
>
> -----Original Message-----
> From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Garren Davis
> Sent: Wednesday, June 03, 1998 11:02 AM
> To: tacgps@tapr.org
> Subject: [TACGPS:1591] Re: ONCORE TTFF
>
>
>
>
>
> I had a chance to play with the ONCORE VP and the TAC32 software
> last night. It seems to take a long time to acquire the sats after a power
> up because the TAC32 software uses the local PC time instead of the
> UTC time when it tells the ONCORE where it is and what time it is.
>
> If I set my PC clock to UTC time then start TAC32 it acquires the sats
> very quickly. Is there some UTC correction I am supposed to use in the
> TAC32 software?
>
> Garren
> > ----------
> > From: Dr Thomas A Clark (W3IWI)[SMTP:clark@tomcat.gsfc.nasa.gov]
> > Reply To: tacgps@tapr.org
> > Sent: Tuesday, June 02, 1998 10:48 AM
> > To: tacgps@tapr.org
> > Subject: [TACGPS:1582] Re: ONCORE TTFF
> >
> > Garren Davis wrote:
> > >
> > > I have another question about the ONCORE receiver. When I first
> > > powered up the ONCORE and started TAC32 it took about a half
> > > hour to aquire the sats. I figure it did a cold start. I played with
> it
> > > and let it run for a few days then turned it off because I was going
> > > on vacation. When I powered it back on and started TAC32 it took
> > > about a half hour again to aquire the sats. I thought with the onboard
> > > battery that it would keep the time and date and therefore would
> > > have a faster time to first fix. Is my thinking wrong or am I supposed
> > > to give the ONCORE a command to tell it to remember the settings

> > > or is this the way the ONCORE is suppose to work?
> >
> > I agree with Rick's comments -- make sure you are not resetting the
> > receiver position. You can see this in the positions window on the main
> > TAC32 screen.
> >
> > A few other factoids: Yes, the purpose of the battery is to keep the
> > on-board clock running so that the receiver "wakes up" knowing the
> > approximate time. There are two other pieces of information it needs
> > to do a "smart start" -- it needs an almanac with Keplerian elements
> > so that it knows which GPS satellites are visible, and it needs to
> > know where you are located. These 3 pieces of information lets your
> > receiver know which satellites to look for.
> >
> > When you power up the receiver, it starts searching for visible
> > satellites by searching the 1023 possible phases of the C/A code
> > for the particular satellite, and by searching in RF frequency based
> > on its predicted Doppler offset. Once the receiver gets code/freq
> > lock, it starts looking for the beginning of the 1500 bit long
> > data message sent at 50 bits/sec -- i.e. beginning every 30 secs.
> > You may have started this step at any time, so the maximum should
> > be 30 sec, minimum zero, and average 15 secs. Finding this boundary
> > lets the rcvr set its clock to a few msec, and it lets it start
> > reading the 1500 bit message. After another 30 secs elapse (assuming
> > there were no dropouts), the receiver has the entire 1500 bit message
> > wnich contains all the information needed to use this satellite's
> > data, including a precise set of orbital elements (ephemeris). When
> > 4 satellites are thus found, the receiver can do a position fix.
> > If the 3 assumptions -- approx time+approx location+almanac known --
> > are true and signals are solid, the acquisition time should be 30-60
> > seconds.
> >
> > If you have been locked up, kill the power, and then re-power the
> > receiver, the acquisition time will be faster because the receiver
> > already knows all the ephemeris & status info. This data is changed
> > a couple of times per day; its validity is tested by a "serial number"
> > called the IODE (Issue of Data Ephemeris) contained in the 1500 bit
> > message.
> >
> > Now lets consider the situation when one of the three assumptions is
> > not valid. Rick suggested that you make sure that TAC32 knows your
> > approximate position, and TAC32 resets the receiver's location to its
> > software default value. If the default is grossly wrong, the receiver
> > will be looking at the wrong satellites!
> >
> > In case you have done a cold reset of the receiver, the almanac data
> > will be missing. Each GPS satellite sends down the almanac for the
> > entire constellation in its 1500 bit message. Unfortunately, it takes
> > 25 cycles to send all the information (i.e. 12.5 minutes) to reload
> > the receiver's almanac replica.
> >
> > Different receivers handle the coldstart condition differently. In
> > most cases, it they see that the clock has stopped, or that no almanac
> > is loaded, they immediately start a "blind" search for satellites.
> > If your receiver has a bogus position and doesn't lock onto some
> > satellites in a few minutes, this also triggers an all-sky, blind
> > search. Since there are 32 possible GPS satellite PRNs, and the ONCORE
> > has only 8 channels, it can only try "tuning in" on a quarter of the
> > possible satellites at a time. It sounds like this is what's happening
> > to you.
> >
> > 73, Tom
> >
>

30. RE: [TACGPS:1592] Re: ONCORE TTFF

From: Garren Davis <g_davis@qlc.com>
Date: Thu, 4 Jun 1998 08:59:58 -0700
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <C02941964DF7D1119B9900805FBB3B7B0AF251@ntmail.qlc.com>
Rendered body type: text/plain

Rick,

Playing around with this a little more I noticed something else. When the
ONCORE is disconnected from the PC and I start TAC32 and it cannot
find the ONCORE it comes up with a message "GPS reciever not found".
It asks if I want to probe for a different serial port. When I give it the
OK

the big red "initializing" message in the clock display changes to the UTC
time. Of course the GPS still cannot be found and the rest of the TAC32
display is blank but the true UTC time was put in the clock display in big
red numbers. Now if I connect the ONCORE and choose edit - set serial port
TAC32 finds the ONCORE then sets the UTC time to the local PC time.

I also noticed that when the ONCORE is connected and TAC32 is started
it initializes the ONCORE and puts the correct UTC time up on the display
but one second later TAC32 changes it back to the local PC time.

The UTC time from GPS shows the local PC time.
The Display is set to UTC and the big red display shows local PC time.
The small PC time window shows local PC time.
Using the Motorola program that came with the ONCORE I looked at the UTC
setting. It said "UTC time correction = enable". I looked at the GMT
setting. It
said "GMT correction = 00:00".

>From the experiment above it looks to me like TAC32 sets the UTC time
correctly
unless a brain dead ONCORE is connected. In that case TAC32 sends the
ONCORE the correct location information but the wrong time information.

If my wording is confusing send me a private EMAIL with your phone number
and I can call you to explain it more clearly. If you want me to try
anything
else let me know. I brought me notebook to work.

Garren Davis
g_davis@qlc.com

> ----------
> From: Richard M. Hambly[SMTP:rick@cnssys.com]
> Reply To: tacgps@tapr.org
> Sent: Wednesday, June 03, 1998 9:20 AM
> To: tacgps@tapr.org
> Subject: [TACGPS:1592] Re: ONCORE TTFF
>
> Garren,
>
> Yes and no. TAC32 works with any time you set your PC to so long as you
> also set your PC's time zone to match. For Win95/98 double click on the
> time in the lower right corner of your main screen (not TAC32). This
> brings
> up the system clock. Click on the Time Zone tag, set your time zone and
> be
> sure Automatically adjust clock for daylight savings is checked. This way
> TAC32 always knows what UTC is and your PC can use local time.
>
> Rick
> WB2TNL
>
> -----Original Message-----
> From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Garren Davis
> Sent: Wednesday, June 03, 1998 11:02 AM
> To: tacgps@tapr.org
> Subject: [TACGPS:1591] Re: ONCORE TTFF
>
>
>
>
>
> I had a chance to play with the ONCORE VP and the TAC32 software
> last night. It seems to take a long time to acquire the sats after a power
> up because the TAC32 software uses the local PC time instead of the
> UTC time when it tells the ONCORE where it is and what time it is.
>
> If I set my PC clock to UTC time then start TAC32 it acquires the sats
> very quickly. Is there some UTC correction I am supposed to use in the
> TAC32 software?
>
> Garren
> > ----------
> > From: Dr Thomas A Clark (W3IWI)[SMTP:clark@tomcat.gsfc.nasa.gov]
> > Reply To: tacgps@tapr.org
> > Sent: Tuesday, June 02, 1998 10:48 AM
> > To: tacgps@tapr.org
> > Subject: [TACGPS:1582] Re: ONCORE TTFF

> >
> > Garren Davis wrote:
> > >
> > > I have another question about the ONCORE receiver. When I first
> > > powered up the ONCORE and started TAC32 it took about a half
> > > hour to aquire the sats. I figure it did a cold start. I played with
> it
> > > and let it run for a few days then turned it off because I was going
> > > on vacation. When I powered it back on and started TAC32 it took
> > > about a half hour again to aquire the sats. I thought with the onboard
> > > battery that it would keep the time and date and therefore would
> > > have a faster time to first fix. Is my thinking wrong or am I supposed
> > > to give the ONCORE a command to tell it to remember the settings
> > > or is this the way the ONCORE is suppose to work?
> > >
> > I agree with Rick's comments -- make sure you are not resetting the
> > receiver position. You can see this in the positions window on the main
> > TAC32 screen.
> > >
> > A few other factoids: Yes, the purpose of the battery is to keep the
> > on-board clock running so that the receiver "wakes up" knowing the
> > approximate time. There are two other pieces of information it needs
> > to do a "smart start" -- it needs an almanac with Keplerian elements
> > so that it knows which GPS satellites are visible, and it needs to
> > know where you are located. These 3 pieces of information lets your
> > receiver know which satellites to look for.
> > >
> > When you power up the receiver, it starts searching for visible
> > satellites by searching the 1023 possible phases of the C/A code
> > for the particular satellite, and by searching in RF frequency based
> > on its predicted Doppler offset. Once the receiver gets code/freq
> > lock, it starts looking for the beginning of the 1500 bit long
> > data message sent at 50 bits/sec -- i.e. beginning every 30 secs.
> > You may have started this step at any time, so the maximum should
> > be 30 sec, minimum zero, and average 15 secs. Finding this boundary
> > lets the rcvr set its clock to a few msec, and it lets it start
> > reading the 1500 bit message. After another 30 secs elapse (assuming
> > there were no dropouts), the receiver has the entire 1500 bit message
> > wnich contains all the information needed to use this satellite's
> > data, including a precise set of orbital elements (ephemeris). When
> > 4 satellites are thus found, the receiver can do a position fix.
> > If the 3 assumptions -- approx time+approx location+almanac known --
> > are true and signals are solid, the acquisition time should be 30-60
> > seconds.
> > >
> > If you have been locked up, kill the power, and then re-power the
> > receiver, the acquisition time will be faster because the receiver
> > already knows all the ephemeris & status info. This data is changed
> > a couple of times per day; its validity is tested by a "serial number"
> > called the IODE (Issue of Data Ephemeris) contained in the 1500 bit
> > message.
> > >
> > Now lets consider the situation when one of the three assumptions is
> > not valid. Rick suggested that you make sure that TAC32 knows your
> > approximate position, and TAC32 resets the receiver's location to its
> > software default value. If the default is grossly wrong, the receiver
> > will be looking at the wrong satellites!
> > >
> > In case you have done a cold reset of the receiver, the almanac data
> > will be missing. Each GPS satellite sends down the almanac for the
> > entire constellation in its 1500 bit message. Unfortunately, it takes
> > 25 cycles to send all the information (i.e. 12.5 minutes) to reload
> > the receiver's almanac replica.
> > >
> > Different receivers handle the coldstart condition differently. In
> > most cases, it they see that the clock has stopped, or that no almanac
> > is loaded, they immediately start a "blind" search for satellites.
> > If your receiver has a bogus position and doesn't lock onto some
> > satellites in a few minutes, this also triggers an all-sky, blind
> > search. Since there are 32 possible GPS satellite PRNs, and the ONCORE
> > has only 8 channels, it can only try "tuning in" on a quarter of the
> > possible satellites at a time. It sounds like this is what's happening
> > to you.
> > >
> > 73, Tom
> > >
>

31. RE: [TACGPS:1604] Re: ONCORE TTFF

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Thu, 4 Jun 1998 23:26:18 -0400
To: <tacgps@tapr.org>
Message-ID: <001401bd9031$b3f1afc0$101161cf@rick.cnssys.com>
Rendered body type: text/plain

Garren,

HOLD THE PRESSES! You have discovered a bug in TAC32!

The bug only effects Motorola receivers and has been fixed in 1.2.7, to be released soon. In the mean time be sure that you leave your GPS receiver on and connected to an antenna for a few minutes before starting TAC32. If the receiver has even one or two satellites locked it will ignore the offending initialization command.

Rick
WB2TNL

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Garren Davis
Sent: Thursday, June 04, 1998 12:13 PM
To: tacgps@tapr.org
Subject: [TACGPS:1604] Re: ONCORE TTFF

Rick,

Playing around with this a little more I noticed something else. When the ONCORE is disconnected from the PC and I start TAC32 and it cannot find the ONCORE it comes up with a message "GPS reciever not found". It asks if I want to probe for a different serial port. When I give it the OK
the big red "initializing" message in the clock display changes to the UTC time. Of course the GPS still cannot be found and the rest of the TAC32 display is blank but the true UTC time was put in the clock display in big red numbers. Now if I connect the ONCORE and choose edit - set serial port TAC32 finds the ONCORE then sets the UTC time to the local PC time.

I also noticed that when the ONCORE is connected and TAC32 is started it initializes the ONCORE and puts the correct UTC time up on the display but one second later TAC32 changes it back to the local PC time.

The UTC time from GPS shows the local PC time.
The Display is set to UTC and the big red display shows local PC time.
The small PC time window shows local PC time.
Using the Motorola program that came with the ONCORE I looked at the UTC setting. It said "UTC time correction = enable". I looked at the GMT setting. It
said "GMT correction = 00:00".

>From the experiment above it looks to me like TAC32 sets the UTC time correctly
unless a brain dead ONCORE is connected. In that case TAC32 sends the ONCORE the correct location information but the wrong time information.

If my wording is confusing send me a private EMAIL with your phone number and I can call you to explain it more clearly. If you want me to try anything
else let me know. I brought me notebook to work.

Garren Davis
g_davis@qlc.com

> ----------
> From: Richard M. Hambly[SMTP:rick@cnssys.com]
> Reply To: tacgps@tapr.org
> Sent: Wednesday, June 03, 1998 9:20 AM
> To: tacgps@tapr.org
> Subject: [TACGPS:1592] Re: ONCORE TTFF
>
> Garren,
>
> Yes and no. TAC32 works with any time you set your PC to so long as you

> also set your PC's time zone to match. For Win95/98 double click on the
> time in the lower right corner of your main screen (not TAC32). This
> brings
> up the system clock. Click on the Time Zone tag, set your time zone and
> be
> sure Automatically adjust clock for daylight savings is checked. This way
> TAC32 always knows what UTC is and your PC can use local time.
>
> Rick
> WB2TNL
>
> -----Original Message-----
> From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Garren Davis
> Sent: Wednesday, June 03, 1998 11:02 AM
> To: tacgps@tapr.org
> Subject: [TACGPS:1591] Re: ONCORE TTFF
>
>
>
>
> I had a chance to play with the ONCORE VP and the TAC32 software
> last night. It seems to take a long time to acquire the sats after a power
> up because the TAC32 software uses the local PC time instead of the
> UTC time when it tells the ONCORE where it is and what time it is.
>
> If I set my PC clock to UTC time then start TAC32 it acquires the sats
> very quickly. Is there some UTC correction I am supposed to use in the
> TAC32 software?
>
> Garren
> > ----------
> > From: Dr Thomas A Clark (W3IWI)[SMTP:clark@tomcat.gsfc.nasa.gov]
> > Reply To: tacgps@tapr.org
> > Sent: Tuesday, June 02, 1998 10:48 AM
> > To: tacgps@tapr.org
> > Subject: [TACGPS:1582] Re: ONCORE TTFF
> >
> > Garren Davis wrote:
> > >
> > > I have another question about the ONCORE receiver. When I first
> > > powered up the ONCORE and started TAC32 it took about a half
> > > hour to aquire the sats. I figure it did a cold start. I played with
> it
> > > and let it run for a few days then turned it off because I was going
> > > on vacation. When I powered it back on and started TAC32 it took
> > > about a half hour again to aquire the sats. I thought with the onboard
> > > battery that it would keep the time and date and therefore would
> > > have a faster time to first fix. Is my thinking wrong or am I supposed
> > > to give the ONCORE a command to tell it to remember the settings
> > > or is this the way the ONCORE is suppose to work?
> > >
> > I agree with Rick's comments -- make sure you are not resetting the
> > receiver position. You can see this in the positions window on the main
> > TAC32 screen.
> > >
> > A few other factoids: Yes, the purpose of the battery is to keep the
> > on-board clock running so that the receiver "wakes up" knowing the
> > approximate time. There are two other pieces of information it needs
> > to do a "smart start" -- it needs an almanac with Keplerian elements
> > so that it knows which GPS satellites are visible, and it needs to
> > know where you are located. These 3 pieces of information lets your
> > receiver know which satellites to look for.
> > >
> > When you power up the receiver, it starts searching for visible
> > satellites by searching the 1023 possible phases of the C/A code
> > for the particular satellite, and by searching in RF frequency based
> > on its predicted Doppler offset. Once the receiver gets code/freq
> > lock, it starts looking for the beginning of the 1500 bit long
> > data message sent at 50 bits/sec -- i.e. beginning every 30 secs.
> > You may have started this step at any time, so the maximum should
> > be 30 sec, minimum zero, and average 15 secs. Finding this boundary
> > lets the rcvr set its clock to a few msec, and it lets it start
> > reading the 1500 bit message. After another 30 secs elapse (assuming
> > there were no dropouts), the receiver has the entire 1500 bit message
> > wnich contains all the information needed to use this satellite's
> > data, including a precise set of orbital elements (ephemeris). When
> > 4 satellites are thus found, the receiver can do a position fix.
> > If the 3 assumptions -- approx time+approx location+almanac known --
> > are true and signals are solid, the acquisition time should be 30-60

> > seconds.
> >
> > If you have been locked up, kill the power, and then re-power the
> > receiver, the acquisition time will be faster because the receiver
> > already knows all the ephemeris & status info. This data is changed
> > a couple of times per day; its validity is tested by a "serial number"
> > called the IODE (Issue of Data Ephemeris) contained in the 1500 bit
> > message.
> >
> > Now lets consider the situation when one of the three assumptions is
> > not valid. Rick suggested that you make sure that TAC32 knows your
> > approximate position, and TAC32 resets the receiver's location to its
> > software default value. If the default is grossly wrong, the receiver
> > will be looking at the wrong satellites!
> >
> > In case you have done a cold reset of the receiver, the almanac data
> > will be missing. Each GPS satellite sends down the almanac for the
> > entire constellation in its 1500 bit message. Unfortunately, it takes
> > 25 cycles to send all the information (i.e. 12.5 minutes) to reload
> > the receiver's almanac replica.
> >
> > Different receivers handle the coldstart condition differently. In
> > most cases, it they see that the clock has stopped, or that no almanac
> > is loaded, they immediately start a "blind" search for satellites.
> > If your receiver has a bogus position and doesn't lock onto some
> > satellites in a few minutes, this also triggers an all-sky, blind
> > search. Since there are 32 possible GPS satellite PRNs, and the ONCORE
> > has only 8 channels, it can only try "tuning in" on a quarter of the
> > possible satellites at a time. It sounds like this is what's happening
> > to you.
> >
> > 73, Tom
> >
>

32. RE: [TACGPS:1605] Re: ONCORE TTFF

From: Garren Davis <g_davis@qlc.com>
Date: Fri, 5 Jun 1998 08:57:49 -0700
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <C02941964DF7D1119B9900805FBB3B7B0AF254@ntmail.qlc.com>
Rendered body type: text/plain

Rick,

Wow. I'm glad I could be of some help. I'm surprised nobody noticed this
before.
I guess most people power up their ONCORE and leave it powered. Can you
give us an idea when 1.2.7 will be out.

Garren

> ----------
> From: Richard M. Hambly[SMTP:rick@cnssys.com]
> Reply To: tacgps@tapr.org
> Sent: Thursday, June 04, 1998 8:31 PM
> To: tacgps@tapr.org
> Subject: [TACGPS:1605] Re: ONCORE TTFF
>
> Garren,
>
> HOLD THE PRESSES! You have discovered a bug in TAC32!
>
> The bug only effects Motorola receivers and has been fixed in 1.2.7, to be
> released soon. In the mean time be sure that you leave your GPS receiver
> on
> and connected to an antenna for a few minutes before starting TAC32. If
> the
> receiver has even one or two satellites locked it will ignore the
> offending
> initialization command.
>
> Rick
> WB2TNL
>
> -----Original Message-----
> From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Garren Davis
> Sent: Thursday, June 04, 1998 12:13 PM
> To: tacgps@tapr.org
> Subject: [TACGPS:1604] Re: ONCORE TTFF

>
>
>
>
> Rick,
>
> Playing around with this a little more I noticed something else. When the
> ONCORE is disconnected from the PC and I start TAC32 and it cannot
> find the ONCORE it comes up with a message "GPS reciever not found".
> It asks if I want to probe for a different serial port. When I give it the
> OK
> the big red "initializing" message in the clock display changes to the UTC
> time. Of course the GPS still cannot be found and the rest of the TAC32
> display is blank but the true UTC time was put in the clock display in big
> red numbers. Now if I connect the ONCORE and choose edit - set serial port
> TAC32 finds the ONCORE then sets the UTC time to the local PC time.
>
> I also noticed that when the ONCORE is connected and TAC32 is started
> it initializes the ONCORE and puts the correct UTC time up on the display
> but one second later TAC32 changes it back to the local PC time.
>
> The UTC time from GPS shows the local PC time.
> The Display is set to UTC and the big red display shows local PC time.
> The small PC time window shows local PC time.
> Using the Motorola program that came with the ONCORE I looked at the UTC
> setting. It said "UTC time correction = enable". I looked at the GMT
> setting. It
> said "GMT correction = 00:00".
>
> >From the experiment above it looks to me like TAC32 sets the UTC time
> correctly
> unless a brain dead ONCORE is connected. In that case TAC32 sends the
> ONCORE the correct location information but the wrong time information.
>
> If my wording is confusing send me a private EMAIL with your phone number
> and I can call you to explain it more clearly. If you want me to try
> anything
> else let me know. I brought me notebook to work.
>
> Garren Davis
> g_davis@qlc.com
>
>
>
> > ----------
> > From: Richard M. Hambly[SMTP:rick@cnssys.com]
> > Reply To: tacgps@tapr.org
> > Sent: Wednesday, June 03, 1998 9:20 AM
> > To: tacgps@tapr.org
> > Subject: [TACGPS:1592] Re: ONCORE TTFF
> >
> > Garren,
> >
> > Yes and no. TAC32 works with any time you set your PC to so long as you
> > also set your PC's time zone to match. For Win95/98 double click on the
> > time in the lower right corner of your main screen (not TAC32). This
> > brings
> > up the system clock. Click on the Time Zone tag, set your time zone and
> > be
> > sure Automatically adjust clock for daylight savings is checked. This
> way
> > TAC32 always knows what UTC is and your PC can use local time.
> >
> > Rick
> > WB2TNL
> >
> > -----Original Message-----
> > From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Garren Davis
> > Sent: Wednesday, June 03, 1998 11:02 AM
> > To: tacgps@tapr.org
> > Subject: [TACGPS:1591] Re: ONCORE TTFF
> >
> >
> >
> >
> >
> > I had a chance to play with the ONCORE VP and the TAC32 software
> > last night. It seems to take a long time to acquire the sats after a
> power
> > up because the TAC32 software uses the local PC time instead of the

> > UTC time when it tells the ONCORE where it is and what time it is.
> >
> > If I set my PC clock to UTC time then start TAC32 it acquires the sats
> > very quickly. Is there some UTC correction I am supposed to use in the
> > TAC32 software?
> >
> > Garren
> > > ----------
> > > From: Dr Thomas A Clark (W3IWI)[SMTP:clark@tomcat.gsfc.nasa.gov]
> > > Reply To: tacgps@tapr.org
> > > Sent: Tuesday, June 02, 1998 10:48 AM
> > > To: tacgps@tapr.org
> > > Subject: [TACGPS:1582] Re: ONCORE TTFF
> > >
> > > Garren Davis wrote:
> > > >
> > > > I have another question about the ONCORE receiver. When I first
> > > > powered up the ONCORE and started TAC32 it took about a half
> > > > hour to aquire the sats. I figure it did a cold start. I played with
> > it
> > > > and let it run for a few days then turned it off because I was going
> > > > on vacation. When I powered it back on and started TAC32 it took
> > > > about a half hour again to aquire the sats. I thought with the
> onboard
> > > > battery that it would keep the time and date and therefore would
> > > > have a faster time to first fix. Is my thinking wrong or am I
> supposed
> > > > to give the ONCORE a command to tell it to remember the settings
> > > > or is this the way the ONCORE is suppose to work?
> > > >
> > > I agree with Rick's comments -- make sure you are not resetting the
> > > receiver position. You can see this in the positions window on the
> main
> > > TAC32 screen.
> > >
> > > A few other factoids: Yes, the purpose of the battery is to keep the
> > > on-board clock running so that the receiver "wakes up" knowing the
> > > approximate time. There are two other pieces of information it needs
> > > to do a "smart start" -- it needs an almanac with Keplerian elements
> > > so that it knows which GPS satellites are visible, and it needs to
> > > know where you are located. These 3 pieces of information lets your
> > > receiver know which satellites to look for.
> > >
> > > When you power up the receiver, it starts searching for visible
> > > satellites by searching the 1023 possible phases of the C/A code
> > > for the particular satellite, and by searching in RF frequency based
> > > on its predicted Doppler offset. Once the receiver gets code/freq
> > > lock, it starts looking for the beginning of the 1500 bit long
> > > data message sent at 50 bits/sec -- i.e. beginning every 30 secs.
> > > You may have started this step at any time, so the maximum should
> > > be 30 sec, minimum zero, and average 15 secs. Finding this boundary
> > > lets the rcvr set its clock to a few msec, and it lets it start
> > > reading the 1500 bit message. After another 30 secs elapse (assuming
> > > there were no dropouts), the receiver has the entire 1500 bit message
> > > wnich contains all the information needed to use this satellite's
> > > data, including a precise set of orbital elements (ephemeris). When
> > > 4 satellites are thus found, the receiver can do a position fix.
> > > If the 3 assumptions -- approx time+approx location+almanac known --
> > > are true and signals are solid, the acquisition time should be 30-60
> > > seconds.
> > >
> > > If you have been locked up, kill the power, and then re-power the
> > > receiver, the acquisition time will be faster because the receiver
> > > already knows all the ephemeris & status info. This data is changed
> > > a couple of times per day; its validity is tested by a "serial number"
> > > called the IODE (Issue of Data Ephemeris) contained in the 1500 bit
> > > message.
> > >
> > > Now lets consider the situation when one of the three assumptions is
> > > not valid. Rick suggested that you make sure that TAC32 knows your
> > > approximate position, and TAC32 resets the receiver's location to its
> > > software default value. If the default is grossly wrong, the receiver
> > > will be looking at the wrong satellites!
> > >
> > > In case you have done a cold reset of the receiver, the almanac data
> > > will be missing. Each GPS satellite sends down the almanac for the
> > > entire constellation in its 1500 bit message. Unfortunately, it takes
> > > 25 cycles to send all the information (i.e. 12.5 minutes) to reload
> > > the receiver's almanac replica.

> > >
> > > Different receivers handle the coldstart condition differently. In
> > > most cases, it they see that the clock has stopped, or that no almanac
> > > is loaded, they immediately start a "blind" search for satellites.
> > > If your receiver has a bogus position and doesn't lock onto some
> > > satellites in a few minutes, this also triggers an all-sky, blind
> > > search. Since there are 32 possible GPS satellite PRNs, and the ONCORE
> > > has only 8 channels, it can only try "tuning in" on a quarter of the
> > > possible satellites at a time. It sounds like this is what's happening
> > > to you.
> > >
> > > 73, Tom
> > >
> >
>

33. Benchmarks NAD27 vs NAD83

From: Doug Bade <doug@clecom.com>
Date: Sat, 06 Jun 1998 14:36:02 -0400
To: tacgps@tapr.org
Message-ID: <3.0.32.19980606143602.007a86a0@en.com>
Rendered body type: text/plain

I am in the process of calibrating my dgpsib ref station off of a
Geodetic monument. The monument records show NAD27 info only, what is the
offset if any to convert to NAD83 ??? I am showing the monument to be about
11 seconds south of the NAD27 location. Longitude looks pretty good.
        We ar at 41*25' N lat and 081*43' W lon in Cleveland Ohio area.
Any ideas?
        THE USGS data is in degreee mins and seconds with thousandths of seconds
after decimal. Not a hundths mins vs seconds issue... in my opinion ,
unless there are major typo's in the Document I received from the county.
        Also I went to a surveyed tower site I have info on, and it reflects the
same error in my GPS . When I shut off differential rcvr, the location
snaps to 11 seconds south of where it was with differential, to the fcc
recorded location. (correct location per NAD83)

        I changed my dif ref location in dgpsib, the 11 seconds I am seeing as an
error, but with the gps tac32 surveyed location all looks good, but the
BENCHMARK is wrong by 11 seconds the other way...
        By correcting the GPSIB +11 sec latitude, the BM is right but everything
else is wrong... HMMMMMM.
        My TAC32 surveyed ref location was surveyed over about 4 days to establish
the coorect reference.

        Any Idea's or places to look for solutions????
                                73 Doug... KB8GVQ   doug@clecom.com

34. Re: [TACGPS:1607] Benchmarks NAD27 vs NAD83

From: "Steven R. Bible" <srbible@gate.net>
Date: Sat, 06 Jun 1998 15:28:45 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980606152845.009654e0@pop.gate.net>
Rendered body type: text/plain

Doug, check out this web site:

   http://WWW.ngs.noaa.gov/FORMS/ds_area.html

Here you can get lat/long for markers. This way you can double check the
data sheet you received from the county. Plus you might find another one
nearby.

- Steve

At 01:46 PM 6/6/98 -0500, you wrote:
>
>   I am in the process of calibrating my dgpsib ref station off of a
>Geodetic monument. The monument records show NAD27 info only, what is the
>offset if any to convert to NAD83 ??? I am showing the monument to be about
>11 seconds south of the NAD27 location. Longitude looks pretty good.
>   We ar at 41*25' N lat and 081*43' W lon in Cleveland Ohio area.
>Any ideas?
>   THE USGS data is in degreee mins and seconds with thousandths of seconds
>after decimal. Not a hundths mins vs seconds issue... in my opinion ,
>unless there are major typo's in the Document I received from the county.
>   Also I went to a surveyed tower site I have info on, and it reflects the

>same error in my GPS . When I shut off differential rcvr, the location
>snaps to 11 seconds south of where it was with differential, to the fcc
>recorded location. (correct location per NAD83)
>
>   I changed my dif ref location in dgpsib, the 11 seconds I am seeing as an
>error, but with the gps tac32 surveyed location all looks good, but the
>BENCHMARK is wrong by 11 seconds the other way...
>   By correcting the GPSIB +11 sec latitude, the BM is right but everything
>else is wrong... HMMMMMM.
>   My TAC32 surveyed ref location was surveyed over about 4 days to establish
>the coorect reference.
>
>   Any Idea's or places to look for solutions????
>   73 Doug... KB8GVQ   doug@clecom.com
>
>
 - Steve
 (n7hpr@tapr.org)

35. Re: [TACGPS:1607] Benchmarks NAD27 vs NAD83

From: Dave Martindale <davem@cs.ubc.ca>
Date: Sat, 6 Jun 1998 13:02:21 -0700
To: tacgps@tapr.org
Message-ID: <l03130302b19f5028b81f@[198.162.38.159]>
Rendered body type: text/plain

>   I am in the process of calibrating my dgpsib ref station off of a
>Geodetic monument. The monument records show NAD27 info only, what is the
>offset if any to convert to NAD83 ??? I am showing the monument to be about
>11 seconds south of the NAD27 location. Longitude looks pretty good.

If you have a handheld GPS available, just set the datum to NAD27,
create a waypoint at the location you have, set the datum back to NAD83,
and you can read the location in NAD83. You probably won't be able to
read the location with the same precision as the original, but you will
be able to read it with a precision of a few meters.

I think there are also calculators on the Web that will do the conversion,
but I don't know their URL.

        Dave

36. RE: [TACGPS:1607] Benchmarks NAD27 vs NAD83

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sat, 6 Jun 1998 17:41:42 -0400
To: <tacgps@tapr.org>
Message-ID: <000301bd9193$e4f31d80$101161cf@rick.cnssys.com>
Rendered body type: text/plain

I have a real coordinate calculator (~$500 from Blue Marble). I would be
glad to run the conversions if you could send the exact NAD27 coordinates.

Rick
WB2TNL

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Doug Bade
Sent: Saturday, June 06, 1998 2:46 PM
To: tacgps@tapr.org
Subject: [TACGPS:1607] Benchmarks NAD27 vs NAD83

        I am in the process of calibrating my dgpsib ref station off of a
Geodetic monument. The monument records show NAD27 info only, what is the
offset if any to convert to NAD83 ??? I am showing the monument to be about
11 seconds south of the NAD27 location. Longitude looks pretty good.
        We ar at 41*25' N lat and 081*43' W lon in Cleveland Ohio area.
Any ideas?
        THE USGS data is in degreee mins and seconds with thousandths of seconds
after decimal. Not a hundths mins vs seconds issue... in my opinion ,
unless there are major typo's in the Document I received from the county.
        Also I went to a surveyed tower site I have info on, and it reflects the
same error in my GPS . When I shut off differential rcvr, the location
snaps to 11 seconds south of where it was with differential, to the fcc
recorded location. (correct location per NAD83)

        I changed my dif ref location in dgpsib, the 11 seconds I am seeing as an

error, but with the gps tac32 surveyed location all looks good, but the
BENCHMARK is wrong by 11 seconds the other way...
        By correcting the GPSIB +11 sec latitude, the BM is right but everything
else is wrong... HMMMMMM.
        My TAC32 surveyed ref location was surveyed over about 4 days to establish
the coorect reference.

        Any Idea's or places to look for solutions????
                                73 Doug... KB8GVQ   doug@clecom.com

37. Re: [TACGPS:1608] Re: Benchmarks NAD27 vs NAD83

From: Doug Bade <doug@clecom.com>
Date: Sun, 07 Jun 1998 00:17:49 -0400
To: tacgps@tapr.org
Message-ID: <3.0.32.19980607001748.0083bbc0@en.com>
Rendered body type: text/plain

What a great info source.. that web site had several monuments nearby,
which have lat/lon's that indicate the data from the county is way off...
They didn't even povide that particular monument, but plenty of others..

        BTW I tried setting my gps to nad27 from wgs84, and the difference was
visible , but not 11 seconds..... Tnx for the help, Doug.. doug@clecom.com
                                                                KB8GVQ

At 02:32 PM 6/6/98 -0500, you wrote:
>Doug, check out this web site:
>
>   http://WWW.ngs.noaa.gov/FORMS/ds_area.html
>
>Here you can get lat/long for markers. This way you can double check the
>data sheet you received from the county. Plus you might find another one
>nearby.
>
>- Steve
>
>
>
>At 01:46 PM 6/6/98 -0500, you wrote:
>>
>>   I am in the process of calibrating my dgpsib ref station off of a
>>Geodetic monument. The monument records show NAD27 info only, what is the
>>offset if any to convert to NAD83 ??? I am showing the monument to be about
>>11 seconds south of the NAD27 location. Longitude looks pretty good.

38. Magellan 3000xl & Kantrinic KP3 plus

From: Dov Dvir <dovdvir@netvision.net.il>
Date: Sun, 07 Jun 1998 13:51:59 +0300
To: tacgps@tapr.org
Message-ID: <357A70CF.274E@netvision.net.il>
Rendered body type: text/plain

Hi,

I am new in the gps aprs business. I have been triying to use GPS and KP
3 plus without success.
It seems that the direct connection between Magellan 3000xl and the TNC
does not work.
The TNC works fine as packet and so doeas the gps when connected direct
to the serial port of the laptop.
Could I get a hint/help?
Regards
Dov Dvir 4Z5 DZ
PS I also tried to download ,unsuccessfully the winaprs. Need help.

39. Preliminary DGPSIB Calibration follow-up

From: Doug Bade <doug@clecom.com>
Date: Sun, 07 Jun 1998 16:26:26 -0400
To: tacgps@tapr.org
Message-ID: <3.0.32.19980607162625.008425d0@en.com>
Rendered body type: text/plain

Hello All at SIG;

        I am happy to announce my DGPSIB is up and running in Cleveland Ohio,
and preliminary calibration with TAC32 over 4 days has produced repeatable
accuracy over REAL Benchmarks :). I am at less than 1/10th of a second from
where I am supposed to be, and altitude info is +_ 20 ft or so.. JUST FOR

STARTERS !!!
        I have checked 4 known lat lon points which I have accurate data for, and all look excellent. I have lots more testing to do, but unfortunately I need to go away for a few days, and will need to pick-up again late next week :(

For anyone who needs a Benchmark database for calibration, the address Steve Bible sent in a previous sig post is fantastic.. all you need is the coordinates of a location you need a benchmark near and viola... more info than I ever expected. Several of the benchmarks I located have been updated this year or in just the recent past.. Boy I love the internet... :)
        I am sending out packets at 5 second intervals, on a 450 freq at this time, which will ultimately be paralleled in 440 and 2m..
        I am doing all my initial testing with a Garmin GPS III, , and EPE's regularly are under 30 ft.. I have used the Beacon from as far as 35 miles out already, but that is why I am using UHF.... Combiners, and High antenna's..etc. make for great range in our area..
        I have a second unit which will go up in downtown Cleveland soon, and will be in 2m, probably 144.39.and in 440 , probably 445.925..

        Does anyone have seconds corellation to feet for lat and lon, or tell me where I can find it if possible.. TNX..

                                                Doug Bade KB8GVQ

40. Re: [TACGPS:1611] Re: Benchmarks NAD27 vs NAD83

From: Doug Bade <doug@clecom.com>
Date: Sun, 07 Jun 1998 16:32:22 -0400
To: tacgps@tapr.org
Message-ID: <3.0.32.19980607163222.0083fa80@en.com>
Rendered body type: text/plain

The monument in Question appears to be miss identified somehow, as with real benchmarks are where they belong. I will take it up with the count engineers, as this seems odd to me..... I do not know if it was a typo or what , but it is WAY off, about 10-11 seconds..

        So the moral of the story is check several before you re-calibrate the DGPSIB unit, as you may be more correct than the engineers office..

                                                        73 all , Doug KB8GVQ
... snip ....

previous thread.....
...

41. Re: [TACGPS:1614] Re: Benchmarks NAD27 vs NAD83

From: Steve Sampson <ssampson@usa-site.net>
Date: Sun, 7 Jun 1998 18:37:12 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199806072337.SAA30026@access.usa-site.net>
Rendered body type: text/plain

The really bad thing, is that everyones property line is off, and the street is in the wrong place :-) Maybe you should not tell them, ha.

Steve

>   The monument in Question appears to be miss identified somehow, as with
> real benchmarks are where they belong. I will take it up with the count
> engineers, as this seems odd to me..... I do not know if it was a typo or
> what , but it is WAY off, about 10-11 seconds..
>
>   So the moral of the story is check several before you re-calibrate the
> DGPSIB unit, as you may be more correct than the engineers office..

42. Re: Benchmarks NAD27 vs NAD83

From: Alan Crosswell <alan@watsun.cc.columbia.edu>
Date: Mon, 8 Jun 98 10:51:35 EDT
To: Doug Bade <doug@clecom.com>
Cc: tacgps@tapr.org
Message-ID: <CMM.0.90.4.897317495.alan@watsol>
Rendered body type: text/plain

Doug Bade <doug@clecom.com> asked:

>...
>   Any Idea's or places to look for solutions????

```
>...

Here's one:  ftp://ftp.ngs.noaa.gov/pub/pcsoft/nadcon/

Here's what the file readme.210 in that directory says:


                                                          March 27, 1997
                                   NADCON
                                Version 2.10

                             Distribution Copy

PROGRAM DESCRIPTION

NADCON transforms latitude and longitude coordinate values between the
North American Datum of 1927 (NAD 27) and the North American Datum of 1983
adjustment of 1986 [NAD 83(86)], as well as between NAD83(86) and data of
various states/regions that have readjusted their NAD83(86) to a High
Accuracy Reference Network (HARN).  NADCON is the Federal standard for NAD 27
to NAD 83 datum transformations (as was articulated in the Federal Register,
Volume 55, Number 155 dated August 10, 1990).  NADCON also transforms data
originally expressed in old island datums that existed in Alaska, Hawaii,
Puerto Rico and Virgin Islands into data referenced to NAD 83(86).  These
island datums are all referred to within the program as NAD 27.  NADCON
automatically chooses the proper transformation; the user does not need to
know the specific name of the old island datum.

...

73 de Alan N2YGK
```

43. Dorothy Update

```
From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Mon, 8 Jun 1998 10:37:20 -0500
To: "HF SIG  list   mailing"<hfsig@tapr.org>, " Spread Spectrum "<ss@tapr.org>,
        " TAPR/AMSAT DSP "<dsp@tapr.org>,
        "APRS SIG  list   mailing"<aprssig@tapr.org>,
        "NETSIG  list   mailing"<netsig@tapr.org>,
        "BBS SIG  list   mailing"<bbssig@tapr.org>,
        " tacgps "<tacgps@tapr.org>, aprsnews@tapr.org, mic-e@tapr.org,
        TAPR Regional Freq <regional_freq@tapr.org>
Message-ID: <v04003a0cb1a1b453317a@[207.43.172.66]>
Rendered body type: text/plain
```

```
For those who want to know.
----

Dorothy was released from the hospital last Friday afternoon and has been
resting at the house (TAPR Office ;-) since then.  The surgery went very
well and there appears to be no complications, except that she doesn't like
the really long scar on her belly.

We (Bill Jones and I) have told Dorothy she cannot step one foot into the
TAPR office until next week sometime.  Thus, expect kits and orders to
start getting out the door in another 7-10 days.  There is a bit of a pile
being generated by this down time, so it will probably be a week or so
after we open back up that we get caught up on everything.

Dorothy wants to thank everyone that thought of her during this ordeal and
she looks forward to getting back into the swing of things.

Cheers - Greg Jones, WD5IVD

-----
Greg Jones, WD5IVD                 Austin, Texas
wd5ivd@tapr.org      http://www.tapr.org/~wd5ivd


Real World, The n.:
        5. Anywhere outside a university.  "Poor fellow, he's left UT
Austin and gone into the real world."
```

44. TAC32 Version 1.2.7 Released

```
From: "Richard M. Hambly" <rick@cnssys.com>
Date: Mon, 8 Jun 1998 12:32:21 -0400
To: <tacgps@tapr.org>, <gpsdev@tapr.org>
Message-ID: <000101bd92fb$02eee860$101161cf@rick.cnssys.com>
```

Rendered body type: text/plain

Version 1.2.7 of the TAC32 software is now available at
http://www.cnssys.com/tac32/
Information on both TAC32 and the CNS Clock are available at
http://www.cnssys.com/

Rick
WB2TNL

Richard M. Hambly
CNS Systems, Inc.
(410) 987-7835
http://www.cnssys.com/

45. Re: [TACGPS:1612] Magellan 3000xl & Kantrinic KP3 plus

From: Robert Winingham <kc5ejk@onramp.net>
Date: Mon, 8 Jun 1998 12:39:50 -0600
To: tacgps@tapr.org
Message-ID: <v03102800b1a0acbbfdf2@[206.50.201.67]>
Rendered body type: text/plain

>I am new in the gps aprs business. I have been triying to use GPS and KP
>3 plus without success.
>It seems that the direct connection between Magellan 3000xl and the TNC
>does not work.
>The TNC works fine as packet and so doeas the gps when connected direct
>to the serial port of the laptop.
>Could I get a hint/help?

You need two things.

1. A volt meter to check for correct pin connections. check pins 2 and 3
   If the Magellan 3000x is like most Garmins the voltage
   is TTL (0 to near 5 v) ie no negative swing.

  a. 98 % of all PC machines and TNC's will work with the this
     TTL type voltage swing.

  b. Have the TNC comm port set to 4800 Baud.
     That's my Garmin NMEA output speed

2. Correct TNC parameters to start GPS mode -- (don't forget INIT GPS)

I use the remote SYSOP mode to test the KPC setup and parameters.
This saves having to swap the I/O cable between the GPS and the Computer.

Hints:
1 . Type all commands to the TNC in UPPER case
    That way you will type $GPRMC as the GPSHEAD parameter.
    Then TNC parser will match the NMEA string from the GPS

IF you forget the $ or type $gprmc then the TNC won't find a
match and nothing goes into the xmit buffer.

There are commands to let you read the content of the four xmit buffers.

If the buffers are empty , check the I/O cable or the GPSHEAD parameter
use a $ as GPSHEAD to match ANY NMEA strings from the gps.

Most people xmit NMEA $GPRMC and $GPGGA
This way you get Time,ALt,Speed and direction)

Set xmit rate faster for testing but slower when you have it working.

There is a KPC3.TXT file that comes with DOS APRS that shows some
sample settings.

WWW.TAPR.ORG also has links to versions of APRS (Dos,Mac,WIN,APRSPlus,Java)

73

Bob - Dallas,TX --- kc5ejk@onramp.net or kc5ejk@amsat.org ---

46. Re: [TACGPS:1613] Preliminary DGPSIB Calibration follow-up

From: "Doug McKinney" <buoy@redshift.com>
Date: Mon, 8 Jun 1998 17:05:39 -0700

To: <tacgps@tapr.org>
Message-ID: <002101bd933a$58dce620$9cc6cccf@buoy.mcktech.com>
Rendered body type: text/plain

-----Original Message-----
From: Doug Bade <doug@clecom.com>
To: tacgps@tapr.org <tacgps@tapr.org>
Date: Sunday, June 07, 1998 1:39 PM
Subject: [TACGPS:1613] Preliminary DGPSIB Calibration follow-up

>Hello All at SIG;
>
> I am happy to announce my DGPSIB is up and running in Cleveland Ohio,
>and preliminary calibration with TAC32 over 4 days has produced repeatable
>accuracy over REAL Benchmarks :). I am at less than 1/10th of a second from
>where I am supposed to be, and altitude info is +_ 20 ft or so.. JUST FOR
>STARTERS !!!
> I have checked 4 known lat lon points which I have accurate data for, and
>all look excellent. I have lots more testing to do, but unfortunately I
>need to go away for a few days, and will need to pick-up again late next
>week :(
>
>For anyone who needs a Benchmark database for calibration, the address
>Steve Bible sent in a previous sig post is fantastic.. all you need is the
>coordinates of a location you need a benchmark near and viola... more info
>than I ever expected. Several of the benchmarks I located have been updated
>this year or in just the recent past.. Boy I love the internet... :)
> I am sending out packets at 5 second intervals, on a 450 freq at this
>time, which will ultimately be paralleled in 440 and 2m..
> I am doing all my initial testing with a Garmin GPS III, , and EPE's
>regularly are under 30 ft.. I have used the Beacon from as far as 35 miles
>out already, but that is why I am using UHF.... Combiners, and High
>antenna's..etc. make for great range in our area..
> I have a second unit which will go up in downtown Cleveland soon, and will
>be in 2m, probably 144.39.and in 440 , probably 445.925..
>
> Does anyone have seconds corellation to feet for lat and lon, or tell me
>where I can find it if possible.. TNX..

For GPS the miles are nautical when calculating deg, min, sec.. The
standard is 6080 feet per nautical mile for mid latitudes in US. 1 deg =
60 nm; 1 min = 1 nm and 1 sec = 6080/60 = 101 ft per sec arc!!
73's Doug

>
>
> Doug Bade KB8GVQ
>

47. Windows 95 lockup with GPS

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Mon, 08 Jun 1998 16:57:45 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980608165745.007f6b80@appstate.campus.mci.net>
Rendered body type: text/plain

I have the GPS-30 running and TAC32 works fine. I find that if the GPS-30
is running and Windows 95 boots up, it hangs part way through the bootup.
I wondered if anyone else has run into this.

I'm using COM6 on an expansion card (4 ports on one interrupt) and suspect
that it something having to do with Win95 "getting confused" when the
serial port drivers load and there is data coming in. Of course one
solution is to disconnect the serial port to the GPS each time Win95 boots
up. Possibly there is some parameter in Win95, e.g. SYSTEM.INI, that might
solve the problem.

Regards,

Don

48. Some GPS-30 experiences

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Mon, 08 Jun 1998 17:21:06 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980608172106.007fbc80@appstate.campus.mci.net>
Rendered body type: text/plain

I find the GPS-30 quits when it gets hot. Since the unit is "naked" (sawed off the cover to get at the 1 PPS), I put it in a Tupperware-like box on the eave of the roof, running a shielded 6 cond cable into the shack.

Everything was working fine until early afternoon, then it quit. The $PGRMT line started coming every second instead of minute, some lines missed the CR, LF, and others had non-printing chars. TAC32 "stalled" with the plenty of sats visible, but none locked. I whipped up a program to monitor the temp reported by the GPS-30. It looks like the temp rise is around 55 to 80 deg F over outside temp. Today when it quit the last reported temp by the GPS-30 was 60 deg C; outside temp under the overhang was 59 deg *F*.

One solution is to power the GPS-30 with +5 reg instead of +12. This should cut the power input at the unit by over 1/2. The other is to go to a remote antenna and bring the naked unit inside where it doesn't have to be in a box. Any similar experiences or thots?

Regards,

Don, W4DH

49. Re: [TACGPS:1622] Some GPS-30 experiences

From: Bryan Mumford <bryan@bmumford.com>
Date: Mon, 8 Jun 1998 22:55:25 -0800
To: tacgps@tapr.org
Message-ID: <v03007813b1a28c34cb8d@[207.71.222.237]>
Rendered body type: text/plain

>I find the GPS-30 quits when it gets hot. Since the unit is "naked" (sawed
>off the cover to get at the 1 PPS), I put it in a Tupperware-like box on
>the eave of the roof, running a shielded 6 cond cable into the shack.

>Any similar experiences or thots?

I found that mine quits when it's too cold (in the middle of the night). I corrected this by laying a towel over it, so the "body heat" was preserved. No, this isn't a permanent solution. I was thinking I'd have to heat it for permanent use. Now I have to air condition it too?

Bryan Mumford
Santa Barbara, California
http://www.bmumford.com

50. lat/long to distance

From: Dave Martindale <davem@cs.ubc.ca>
Date: Tue, 9 Jun 1998 00:01:24 -0700
To: tacgps@tapr.org
Message-ID: <l03130304b1a28d75bc22@[198.162.38.159]>
Rendered body type: text/plain

>> Does anyone have seconds corellation to feet for lat and lon, or tell me
>>where I can find it if possible.. TNX..

If you don't mind working in metric units, a reasonably accurate conversion is easy to remember. The meter was originally intended to be 1 ten-millionth of the distance between equator and pole (i.e. 90 degrees of latitude). So to convert degrees latitude to meters, divide by 90 and multiply by 1e7.

At the equator, a degree of longitude is the same size as a degree of latitude, but it decreases towards the poles in proportion to the cosine of latitude. So to convert degrees longitude to meters, divide by 90, multiply by 1e7, and multiply by cos(latitude).

        Dave

51. Re: [TACGPS:1623] Re: Some GPS-30 experiences

From: joop@cubemail.com
Date: Mon, 08 Jun 1998 00:10:02 -0700
To: tacgps@tapr.org
Message-ID: <357B8E4A.5420@cubemail.com>
Rendered body type: text/plain

I just purchased a Garmin OEM unit. The thing looks like a mouse. I am new to this. It was supposed to be wired for DB-9 and power. I have no book or info. Can someone help. Garmin has not replied to e-mail.

52. Re: [TACGPS:1621] Windows 95 lockup with GPS

From: Terje Mathisen <Terje.Mathisen@hda.hydro.com>
Date: Tue, 09 Jun 1998 09:39:01 +0200
To: tacgps@tapr.org
Message-ID: <357CE695.4547150C@hda.hydro.com>
Rendered body type: text/plain

Donald E. Haselwood wrote:
>
> I have the GPS-30 running and TAC32 works fine. I find that if the GPS-30
> is running and Windows 95 boots up, it hangs part way through the bootup.
> I wondered if anyone else has run into this.

This is probably (almost certainly!) due to the Plug&Play code in Win95:

It by default tries to detect what kind of hardware might be connected
to any/all ports each time you boot.

On WinNT (which doesn't have PnP) you can still suffer a similar problem
from the serial mouse driver, which will try to load if some traffic is
detected on the serial port, this can be disabled with an option on the
kernel load line (in BOOT.INI).

> I'm using COM6 on an expansion card (4 ports on one interrupt) and suspect
> that it something having to do with Win95 "getting confused" when the
> serial port drivers load and there is data coming in. Of course one
> solution is to disconnect the serial port to the GPS each time Win95 boots
> up. Possibly there is some parameter in Win95, e.g. SYSTEM.INI, that might
> solve the problem.

Sorry, I don't know how to handle this under Win95. :-(

Terje

--
- <Terje.Mathisen@hda.hydro.com>
Using self-discipline, see http://www.eiffel.com/discipline
"almost all programming can be viewed as an exercise in caching"

53. Re: [TACGPS:1622] Some GPS-30 experiences

From: Bob Bruninga <bruninga@nadn.navy.mil>
Date: Tue, 9 Jun 1998 07:26:47 -0400 (EDT)
To: tacgps@tapr.org
Message-ID: <Pine.SOL.3.96.980609072508.22666C-100000@arctic>
Rendered body type: text/plain

On Mon, 8 Jun 1998, Donald E. Haselwood wrote:

> I find the GPS-30 quits when it gets hot.

If it is exposed to the sun, paint it white. You wont believe the
difference.. It will be quite cooler...

54. Re: [TACGPS:1624] lat/long to distance

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Tue, 09 Jun 1998 11:35:51 +0000
To: tacgps@tapr.org
Message-ID: <357D1E17.F53C1338@clark.net>
Rendered body type: text/plain

Thanks to Dave Martindale for posting his answer to this oft-asked
question. I was about to post a similar reply. It is good to realize the
basic definitions, because you can then figure out the answer for
yourself whenever it is needed. Let me just add a few other comments
to Dave's:
> >> Does anyone have seconds corellation to feet for lat and lon, or tell me
> >>where I can find it if possible.. TNX..
>
> If you don't mind working in metric units, a reasonably accurate
> conversion is easy to remember. The meter was originally intended to
> be 1 ten-millionth of the distance between equator and pole (i.e. 90
> degrees of latitude). So to convert degrees latitude to meters, divide
> by 90 and multiply by 1e7.

Therefore one degree of latitude is 111.11111 km. To continue the calculation,
there are 60 minutes of arc per degree, so 1 arc minute is about 1.852 km.
And there are 60 arc seconds per minute, so one second = 30.9 meters.

The calculation in nautical miles is also pretty trivial. The NM is defined

with 60 NM = 1 degree and 1 NM = 1 minute of arc. And we get 1 second =
1/60 NM.

To figure out the feet/miles conversions, the relevant definitions are that
there are exactly 39.37 inches in a meter, 12 inches in a foot, and 5280 feet
in a statute mile; to convert meters to feet, we multiply by (39.37/12)=3.281.
To convert from kilometers to miles, multiply by (3.281*1000/5280)=0.6214.

Putting all this together, we have this table for latitude:
1 degree = 111.1 km = 60 NM = 69.041 miles
1 minute = 1.852 km = 1 NM = 1.151 miles = 6077.3 feet
1 second =   30.9 m = .01666 NM = 0.019 miles = 101.26 feet

> At the equator, a degree of longitude is the same size as a degree of
> latitude, but it decreases towards the poles in proportion to the cosine
> of latitude. So to convert degrees longitude to meters, divide by 90,
> multiply by 1e7, and multiply by cos(latitude).

Washington, Dayton, Denver and Reno are all at a latitude in the 39-40
degree range, where cos(lat) ~ 0.78, so across the middle of the USA,
the table looks like

1 degree = ~86.7 km = ~46.8 NM = ~53.8 miles
1 minute = ~1.44 km = ~0.78 NM = ~0.90 miles = ~4740 feet
1 second = ~ 24.1 m = ~.013 NM = ~.015 miles = ~79 feet

      -

An aside for completeness: Dave's response and mine made a simplifying
assumption -- that the earth is a sphere. In fact, the earth is flattened
by the centrifugal force of the earth's rotation.

The radius of the equator is about 6378 km while the polar radius is
about 30 km smaller. The original definition of the meter was that
90 degrees = 10,000 km measured north-south along the meridian of Paris.

Around the equator, the 6378 km radius translates into about 10,019 km.
If you want to be really precise, this ~0.2% difference due to flattening
needs to be included, but the calculations get to be rather messy!

73, Tom

55. Re: [TACGPS:1623] Re: Some GPS-30 experiences

From: Bob Bruninga <bruninga@nadn.navy.mil>
Date: Tue, 9 Jun 1998 07:44:08 -0400 (EDT)
To: tacgps@tapr.org
Message-ID: <Pine.SOL.3.96.980609074200.22666E-100000@arctic>
Rendered body type: text/plain

On Tue, 9 Jun 1998, Bryan Mumford wrote:

> I found that mine quits when it's too cold (in the middle of the night). I
> corrected this by laying a towel over it, so the "body heat" was preserved.

Paint it white. White also helps to keep it warmer at night since the
device loses less heat to night sky radiation. A black object will always
get much colder under a black sky than a white one.

56. Motorola's ONCORE web site

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Tue, 09 Jun 1998 11:51:40 +0000
To: TACGPS <tacgps@tapr.org>
Message-ID: <357D21CC.E0F1D4FD@clark.net>
Rendered body type: text/plain

For those of you wanting to see more about the ONCORE receivers,
the ONCORE web site can be found at

    http://www.oncore.motorola.com/
which re-directs your request to
    http://www.mot.com/ACCES/GPS/products/

Of particular interest is the material on the new tiny version, called
the ONCORE SL (http://www.mot.com/ACCES/GPS/products/prodsl.html).
The SL appears to be a small version of the ONCORE GT intended to
be embedded in automotive systems.

Also click on the FAQ's button and see the pointers on timing.

Of interest to me was Mike King's FCS paper in PDF format at URL

    http://www.mot.com/ACCES/GPS/pdfs/fcs.pdf

Here Motorola shows their version of the TAC results, in good
agreement with what I havemeasured with the ONCOREs.

73, Tom

57. DoD's GPS material on the web

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Tue, 09 Jun 1998 12:19:25 +0000
To: TACGPS <tacgps@tapr.org>
Message-ID: <357D284D.C254600B@clark.net>
Rendered body type: text/plain

For those of you who are interested in the future of GPS, you
might want to browse the JPO (Joint Program Office) web site
at URL

    http://www.laafb.af.mil/SMC/CZ/homepage/

This site has pointers to a wealth of information. If you are
interested in technical details on the DoD's views about the
civilan users, look at the Signal Development chain and find

    http://www.laafb.af.mil/SMC/CZ/homepage/lm/overview.htm

Recently I've been involved in INMARSAT/MSS proposals to share the
L1 spectrum with communications satellites. See the INMARSAT
ENCROACHMENT button, and in particular

    http://www.laafb.af.mil/SMC/CZ/homepage/future/report.htm

Photos of the current Block IIR satellites can be found from the
Resource Library button at

    http://www.laafb.af.mil/SMC/CZ/homepage/gallery/gallery.htm

Some "How does GPS work?" charts are found at

    http://www.laafb.af.mil/SMC/CZ/homepage/space/index.html and
    http://www.laafb.af.mil/SMC/CZ/homepage/user/index.html and
    http://www.laafb.af.mil/SMC/CZ/homepage/user/u_e123.htm

You'll also find the pointer to Aerospace Corp's GPS PRIMER at

    http://www.aero.org/publications/GPSPRIMER/index.html

Hope you find some of this material useful -- 73, Tom

58. Re: [TACGPS:1627] Re: Some GPS-30 experiences

From: "Lloyd Verhage" <verhage@humec.ksu.edu>
Date: Tue, 9 Jun 1998 07:29:25 CST6CDT
To: tacgps@tapr.org
Message-ID: <184820A531A@humec.ksu.edu>
Rendered body type: text/plain

> If it is exposed to the sun, paint it white. You wont believe the
> difference.. It will be quite cooler...

Okay, I've got one for you all........

I'll be using a GPS30PC on a balloon capsule. I expect it to make at
least 100,000 feet. Air temps will drop to -61 F on the way up and
then start warming up to about -20 F. The unit will be on top of
the capsule and exposed to sunlight. Since we're floating over 99%
of the atmosphere and well within the ozone layer (more intense
sunlight), what color should the unit be?

Thanks for any input. I hope this question gets a few heads
scratched.

By the way I'm sure of the answer myself. I don't need to know the

altitude above 60k, so the unit was priced right. The capsule will
be used for a crossband repeater (we're going to get into repreater
300 miles away :)). Actually we'll be careful and use a safe
frequency.

Lloyd
www.ksu.edu/humec/knsp/

59. Re: [TACGPS:1622] Some GPS-30 experiences

From: K4ITV@aol.com
Date: Tue, 9 Jun 1998 08:41:06 EDT
To: tacgps@tapr.org
Message-ID: <32434c95.357d2d63@aol.com>
Rendered body type: text/plain

I have one that worked fine for 6-7 months but it quit suddenly and now
outputs nothing. Wonder what you do in this case since all my pleas for help
have produced nothing? Junk box??

73, de Charlie K4ITV

60. Re: [TACGPS:1632] Re: Some GPS-30 experiences

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Tue, 09 Jun 1998 15:06:54 +0000
To: tacgps@tapr.org
Message-ID: <357D4F8E.96A647C0@clark.net>
Rendered body type: text/plain

Lloyd Verhage wrote:
> Okay, I've got one for you all........
>
> I'll be using a GPS30PC on a balloon capsule. I expect it to make at
> least 100,000 feet. Air temps will drop to -61 F on the way up and
> then start warming up to about -20 F. The unit will be on top of
> the capsule and exposed to sunlight. Since we're floating over 99%
> of the atmosphere and well within the ozone layer (more intense
> sunlight), what color should the unit be?
>
> Thanks for any input. I hope this question gets a few heads
> scratched.
>
> By the way I'm sure of the answer myself. I don't need to know the
> altitude above 60k, so the unit was priced right. The capsule will
> be used for a crossband repeater (we're going to get into repreater
> 300 miles away :)). Actually we'll be careful and use a safe
> frequency.
>
> Lloyd
> www.ksu.edu/humec/knsp/

My advice on the temperature is that you should try cooling the
receiver in a temperature chamber. As a starter, use your home
deep freeze. To get it colder, get some dry ice from the local
ice cream store.

Regarding the 60kft limit -- I don't know about the Garmin.
However the Motorola ONCOREs, and the older PVT6's which have
firmware releases 5.x and greater have no 60kft limitation.
I believe this is also the case for the Collins/Rockwell
units. Under no conditions use a Trimble SV-6 receiver.

The 60kft limit comes from the COCOM export limit, affectionately
known as the "Anti-SCUD Rule". It applies export limitations for
any receiver capable of operating above 60kft AND at a speed in
excess of Mach 2.

Some manufacturers (like Trimble, and Motorola with the pre-1994
PVT-6's) applied a clamp when either of the two conditions
applied. In the case of the Trimble, it was the equivalent of
a ctrl-alt-del reboot, and the position reset to Sunnyvale CA!

Motorola (and perhaps others) looked at the rule and applied the
two conditions of the anti-Scud test using the logical AND (not
OR as Trimble had done). The Motorola technical manual specs
explicitly state that the ONCORE will work above 60kft for speeds
under 1000 knots -- just to accommodate the balloon case.
The ONCORE spec also states that the operating temp range is -30C
to +85C.

If I were the one setting up this experiment, I'd get an ONCORE
and put it (along with other critical electronics) in a small
foam box (like used to hold a 6-pack of beer) to keep it warm.
People have had a lot of problems with GPS-20s & -30s, not just
from temperature, but also from their difficulty in locking up;
I certainly wouldn't depend on one for a critical application.

BTW, one trick some of the balloonists do to help recover
their package is to put a beeping Sonalert across an ordinary
alkaline 9V battery on the outside of the package. The battery
freezes as it reaches altitude (saving power), and when it warms
up on deescent, it starts making noise. This makes it a lot easier
to find the balloon when it is snagged in trees in a forest!

73, Tom

61. Re: [TACGPS:1634] Re: Some GPS-30 experiences

From: "Lloyd Verhage" <verhage@humec.ksu.edu>
Date: Tue, 9 Jun 1998 10:56:38 CST6CDT
To: tacgps@tapr.org
Message-ID: <187F64A116B@humec.ksu.edu>
Rendered body type: text/plain

> My advice on the temperature is that you should try cooling the
> receiver in a temperature chamber. As a starter, use your home
> deep freeze. To get it colder, get some dry ice from the local
> ice cream store.

My own space environmental chamber!

> Regarding the 60kft limit -- I don't know about the Garmin.
> However the Motorola ONCOREs, and the older PVT6's which have
> firmware releases 5.x and greater have no 60kft limitation.
> I believe this is also the case for the Collins/Rockwell
> units. Under no conditions use a Trimble SV-6 receiver.

We user a GPS25 on one capsule and the OnCore on the other. Those
two work well. Thanks for the info on the Trimble.

> In the case of the Trimble, it was the equivalent of
> a ctrl-alt-del reboot, and the position reset to Sunnyvale CA!

!!!!!
I can't imagine why they'd do something like that!

Thanks for the info

62. Re: [TACGPS:1633] Re: Some GPS-30 experiences

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Tue, 09 Jun 1998 12:09:50 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980609120950.007f9520@appstate.campus.mci.net>
Rendered body type: text/plain

At 07:45 AM 6/9/98 -0500, you wrote:
>I have one that worked fine for 6-7 months but it quit suddenly and now
>outputs nothing. Wonder what you do in this case since all my pleas for help
>have produced nothing? Junk box??
>
>73, de Charlie K4ITV
>

Charlie,

I'd go over the unit with a soldering iron, i.e. resolder the shields,
resolder the post in the center of the patch antenna (one of mine looked
like the solder had cracked). I unsoldering the shield w patch antenna on
one unit and it looked like very marginal solder joint from the coax center
wire to the patch antenna. This assumes the thing "runs" but doesn't
"work," i.e. sends serial data but doesn't see sats, etc., If it doesn't
even send serial data then I'd unsolder the shields and attempt resoldering
parts on the PC board...not much to lose!

Don, W4DH

63. Re: [TACGPS:1633] Re: Some GPS-30 experiences

From: Dave Martindale <davem@cs.ubc.ca>
Date: Tue, 9 Jun 1998 09:56:56 -0700

To: tacgps@tapr.org
Message-ID: <l03130306b1a3183d5746@[198.162.38.159]>
Rendered body type: text/plain

>I have one that worked fine for 6-7 months but it quit suddenly and now
>outputs nothing. Wonder what you do in this case since all my pleas for help
>have produced nothing? Junk box??

If it were mine, I would at least crack open the case and check signals
at the connector of the GPS 20 hidden inside. The problem might be as
simple as a dislodged connector or a broken wire in the cable, and thus
easily fixed.

You could also ask Garmin what it would cost to repair the unit (before
cracking it open).

If it's too expensive for Garmin to repair, and you can't find the
problem yourself, then it may be junkbox time. Or give it to someone
who likes intricate devices to play with. I wouldn't mind having a
dead GPS board myself to pass around when I do a talk about GPS, but
I'm not going to do that with my working GPS 25!

        Dave

64. Re: [TACGPS:1632] Re: Some GPS-30 experiences

From: "Doug McKinney" <buoy@redshift.com>
Date: Tue, 9 Jun 1998 09:52:37 -0700
To: <tacgps@tapr.org>
Message-ID: <004401bd93c7$90d07f00$75c6cccf@buoy.mcktech.com>
Rendered body type: text/plain

-----Original Message-----
From: Lloyd Verhage <verhage@humec.ksu.edu>
To: tacgps@tapr.org <tacgps@tapr.org>
Date: Tuesday, June 09, 1998 5:44 AM
Subject: [TACGPS:1632] Re: Some GPS-30 experiences

>> If it is exposed to the sun, paint it white. You wont believe the
>> difference.. It will be quite cooler...
>
>Okay, I've got one for you all........
>
>I'll be using a GPS30PC on a balloon capsule. I expect it to make at
>least 100,000 feet. Air temps will drop to -61 F on the way up and
>then start warming up to about -20 F. The unit will be on top of
>the capsule and exposed to sunlight. Since we're floating over 99%
>of the atmosphere and well within the ozone layer (more intense
>sunlight), what color should the unit be?
>
>Thanks for any input. I hope this question gets a few heads
>scratched.
>
>By the way I'm sure of the answer myself. I don't need to know the
>altitude above 60k, so the unit was priced right. The capsule will
>be used for a crossband repeater (we're going to get into repreater
>300 miles away :)). Actually we'll be careful and use a safe
>frequency.
>
>Lloyd
>www.ksu.edu/humec/knsp/
>

OK, first of all, check out http://fly.hiwaay.net/~bbrown. I have flown
many balloons with Bill Brown (bbrown). We protect all equipment from the
extreme temperature by using Styrofoam encasements. The GPS antenna is not
affected by the Styrofoam, so you can embed the GPS antenna (GPS30) in the
Styrofoam an keep it out of the temperature extremes. The Styrofoam also
protects the equipment package on recovery impact (via parachute).
73's
Doug

65. Antenna troubleshooting help needed

From: John Ackermann N8UR <jra@febo.com>
Date: Wed, 10 Jun 1998 08:39:12 -0400
To: tacgps@tapr.org
Message-ID: <199806101239.IAA00535@meow.febo.com>
Rendered body type: text/plain

As you may know from my earlier posts, I've been doing some experiments to determine the effect of the nearby trees on my GPS signal.

As what I thought would be the last phase of the experiment, I replaced the feedline a couple of days ago with 9913 to gain a bunch of dB.

However, the results are not what I expected, and I wonder if I have an antenna problem.

The antenna and feedline work in at least a gross fashion -- at some times I'm tracking up to six satellites (PVT-6 receiver, so that's all I can see) and I see signal strength readings (as reported by SA Watch -- don't know how that compares with TAC32) of 30 or higher on high-elevation SVs, and in the low 20s and sometimes high teens on birds that are closer to the horizon. (Are these values in the ballpark? Any comments on what I *should* be seeing with a properly functioning system?)

However, I'm seeing many situations where high elevation -- 45 degrees or more -- SVs that should not be obstructed by terrain, buildings, or foliage aren't being tracked. They'll track at a lower elevation, go away, and then perhaps come back later. This causes very strange results, like tracking only three SVs and having an HDOP of 11.4 (!) when there are two or three other birds that by all rights should be tracked at that time.

Since there's no obstruction to block those SVs, I wonder if I have a problem with very weird lobes in my antenna pattern, or possibly a damaged antenna.

The antenna is the old-style Motorola hockey puck magnet mount (not the new small one that TAPR is selling). It's stuck via the magnet to a metal shelf bracket clamped to the side of my tower. The antenna is at the end of the bracket, about 10 inches out from the tower. Other than the 1 1/2 inch or so wide shelf, there's no metal under the antenna.

The lack of ground plane concerned me at first, but the illustrations in the Motorola docs show a version of this antenna mounted at the top of a pipe with no ground plane, so I presumed that it would work in this mode. But now I wonder if perhaps the lack of metal under the antenna might be the problem. If so, how large a piece of metal should I have under the antenna?

If that isn't the problem, any suggestions on what it might be? I didn't notice this effect at all last winter when I ran my first series of tests, but I believe it was occurring in my test a couple of weeks ago, when I was still using the old RG-58 feedline. At the time I wrote it off to the lossy cable, but that shouldn't be an excuse now.

Help!

73,
John N8UR
jra@febo.com

66. RE: [TACGPS:1606] Re: ONCORE TTFF

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Thu, 11 Jun 1998 08:53:41 -0400
To: <tacgps@tapr.org>
Message-ID: <000d01bd9537$f5e1d580$101161cf@rick.cnssys.com>
Rendered body type: text/plain

Garren,

Have you tried TAC32 1.2.7 yet?

Rick

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Garren Davis
Sent: Friday, June 05, 1998 12:15 PM
To: tacgps@tapr.org
Subject: [TACGPS:1606] Re: ONCORE TTFF

Rick,

Wow. I'm glad I could be of some help. I'm surprised nobody noticed this before.
I guess most people power up their ONCORE and leave it powered. Can you

give us an idea when 1.2.7 will be out.

Garren

> ----------
> From: Richard M. Hambly[SMTP:rick@cnssys.com]
> Reply To: tacgps@tapr.org
> Sent: Thursday, June 04, 1998 8:31 PM
> To: tacgps@tapr.org
> Subject: [TACGPS:1605] Re: ONCORE TTFF
>
> Garren,
>
> HOLD THE PRESSES! You have discovered a bug in TAC32!
>
> The bug only effects Motorola receivers and has been fixed in 1.2.7, to be
> released soon. In the mean time be sure that you leave your GPS receiver
> on
> and connected to an antenna for a few minutes before starting TAC32. If
> the
> receiver has even one or two satellites locked it will ignore the
> offending
> initialization command.
>
> Rick
> WB2TNL
>
> -----Original Message-----
> From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Garren Davis
> Sent: Thursday, June 04, 1998 12:13 PM
> To: tacgps@tapr.org
> Subject: [TACGPS:1604] Re: ONCORE TTFF
>
>
>
>
>
> Rick,
>
> Playing around with this a little more I noticed something else. When the
> ONCORE is disconnected from the PC and I start TAC32 and it cannot
> find the ONCORE it comes up with a message "GPS reciever not found".
> It asks if I want to probe for a different serial port. When I give it the
> OK
> the big red "initializing" message in the clock display changes to the UTC
> time. Of course the GPS still cannot be found and the rest of the TAC32
> display is blank but the true UTC time was put in the clock display in big
> red numbers. Now if I connect the ONCORE and choose edit - set serial port
> TAC32 finds the ONCORE then sets the UTC time to the local PC time.
>
> I also noticed that when the ONCORE is connected and TAC32 is started
> it initializes the ONCORE and puts the correct UTC time up on the display
> but one second later TAC32 changes it back to the local PC time.
>
> The UTC time from GPS shows the local PC time.
> The Display is set to UTC and the big red display shows local PC time.
> The small PC time window shows local PC time.
> Using the Motorola program that came with the ONCORE I looked at the UTC
> setting. It said "UTC time correction = enable". I looked at the GMT
> setting. It
> said "GMT correction = 00:00".
>
> >From the experiment above it looks to me like TAC32 sets the UTC time
> correctly
> unless a brain dead ONCORE is connected. In that case TAC32 sends the
> ONCORE the correct location information but the wrong time information.
>
> If my wording is confusing send me a private EMAIL with your phone number
> and I can call you to explain it more clearly. If you want me to try
> anything
> else let me know. I brought me notebook to work.
>
> Garren Davis
> g_davis@qlc.com
>
>
>
> > ----------
> > From: Richard M. Hambly[SMTP:rick@cnssys.com]
> > Reply To: tacgps@tapr.org

> > Sent: Wednesday, June 03, 1998 9:20 AM
> > To: tacgps@tapr.org
> > Subject: [TACGPS:1592] Re: ONCORE TTFF
> >
> > Garren,
> >
> > Yes and no. TAC32 works with any time you set your PC to so long as you
> > also set your PC's time zone to match. For Win95/98 double click on the
> > time in the lower right corner of your main screen (not TAC32). This
> > brings
> > up the system clock. Click on the Time Zone tag, set your time zone and
> > be
> > sure Automatically adjust clock for daylight savings is checked. This
> way
> > TAC32 always knows what UTC is and your PC can use local time.
> >
> > Rick
> > WB2TNL
> >
> > -----Original Message-----
> > From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Garren Davis
> > Sent: Wednesday, June 03, 1998 11:02 AM
> > To: tacgps@tapr.org
> > Subject: [TACGPS:1591] Re: ONCORE TTFF
> >
> >
> >
> >
> > I had a chance to play with the ONCORE VP and the TAC32 software
> > last night. It seems to take a long time to acquire the sats after a
> power
> > up because the TAC32 software uses the local PC time instead of the
> > UTC time when it tells the ONCORE where it is and what time it is.
> >
> > If I set my PC clock to UTC time then start TAC32 it acquires the sats
> > very quickly. Is there some UTC correction I am supposed to use in the
> > TAC32 software?
> >
> > Garren
> > > ----------
> > > From: Dr Thomas A Clark (W3IWI)[SMTP:clark@tomcat.gsfc.nasa.gov]
> > > Reply To: tacgps@tapr.org
> > > Sent: Tuesday, June 02, 1998 10:48 AM
> > > To: tacgps@tapr.org
> > > Subject: [TACGPS:1582] Re: ONCORE TTFF
> > >
> > > Garren Davis wrote:
> > > >
> > > > I have another question about the ONCORE receiver. When I first
> > > > powered up the ONCORE and started TAC32 it took about a half
> > > > hour to aquire the sats. I figure it did a cold start. I played with
> > it
> > > > and let it run for a few days then turned it off because I was going
> > > > on vacation. When I powered it back on and started TAC32 it took
> > > > about a half hour again to aquire the sats. I thought with the
> onboard
> > > > battery that it would keep the time and date and therefore would
> > > > have a faster time to first fix. Is my thinking wrong or am I
> supposed
> > > > to give the ONCORE a command to tell it to remember the settings
> > > > or is this the way the ONCORE is suppose to work?
> > >
> > > I agree with Rick's comments -- make sure you are not resetting the
> > > receiver position. You can see this in the positions window on the
> main
> > > TAC32 screen.
> > >
> > > A few other factoids: Yes, the purpose of the battery is to keep the
> > > on-board clock running so that the receiver "wakes up" knowing the
> > > approximate time. There are two other pieces of information it needs
> > > to do a "smart start" -- it needs an almanac with Keplerian elements
> > > so that it knows which GPS satellites are visible, and it needs to
> > > know where you are located. These 3 pieces of information lets your
> > > receiver know which satellites to look for.
> > >
> > > When you power up the receiver, it starts searching for visible
> > > satellites by searching the 1023 possible phases of the C/A code
> > > for the particular satellite, and by searching in RF frequency based
> > > on its predicted Doppler offset. Once the receiver gets code/freq

> > > lock, it starts looking for the beginning of the 1500 bit long
> > > data message sent at 50 bits/sec -- i.e. beginning every 30 secs.
> > > You may have started this step at any time, so the maximum should
> > > be 30 sec, minimum zero, and average 15 secs. Finding this boundary
> > > lets the rcvr set its clock to a few msec, and it lets it start
> > > reading the 1500 bit message. After another 30 secs elapse (assuming
> > > there were no dropouts), the receiver has the entire 1500 bit message
> > > wnich contains all the information needed to use this satellite's
> > > data, including a precise set of orbital elements (ephemeris). When
> > > 4 satellites are thus found, the receiver can do a position fix.
> > > If the 3 assumptions -- approx time+approx location+almanac known --
> > > are true and signals are solid, the acquisition time should be 30-60
> > > seconds.
> > >
> > > If you have been locked up, kill the power, and then re-power the
> > > receiver, the acquisition time will be faster because the receiver
> > > already knows all the ephemeris & status info. This data is changed
> > > a couple of times per day; its validity is tested by a "serial number"
> > > called the IODE (Issue of Data Ephemeris) contained in the 1500 bit
> > > message.
> > >
> > > Now lets consider the situation when one of the three assumptions is
> > > not valid. Rick suggested that you make sure that TAC32 knows your
> > > approximate position, and TAC32 resets the receiver's location to its
> > > software default value. If the default is grossly wrong, the receiver
> > > will be looking at the wrong satellites!
> > >
> > > In case you have done a cold reset of the receiver, the almanac data
> > > will be missing. Each GPS satellite sends down the almanac for the
> > > entire constellation in its 1500 bit message. Unfortunately, it takes
> > > 25 cycles to send all the information (i.e. 12.5 minutes) to reload
> > > the receiver's almanac replica.
> > >
> > > Different receivers handle the coldstart condition differently. In
> > > most cases, it they see that the clock has stopped, or that no almanac
> > > is loaded, they immediately start a "blind" search for satellites.
> > > If your receiver has a bogus position and doesn't lock onto some
> > > satellites in a few minutes, this also triggers an all-sky, blind
> > > search. Since there are 32 possible GPS satellite PRNs, and the ONCORE
> > > has only 8 channels, it can only try "tuning in" on a quarter of the
> > > possible satellites at a time. It sounds like this is what's happening
> > > to you.
> > >
> > > 73, Tom
> > >
> >
>

67. RE: [TACGPS:1640] Re: ONCORE TTFF

From: Garren Davis <g_davis@qlc.com>
Date: Thu, 11 Jun 1998 08:14:53 -0700
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <C02941964DF7D1119B9900805FBB3B7B0AF25B@ntmail.qlc.com>
Rendered body type: text/plain

Rick,

Yes I tried 1.2.7 and it works great.
I noticed in the HELP section for the "Timing Setup" there is mention of
a display for "Total Early" which shows the sum of the four early offset
controls but I don't see it in the "Timing Setup" window. Am I looking in
the wrong place?

Garren

> ----------
> From: Richard M. Hambly[SMTP:rick@cnssys.com]
> Reply To: tacgps@tapr.org
> Sent: Thursday, June 11, 1998 6:01 AM
> To: tacgps@tapr.org
> Subject: [TACGPS:1640] Re: ONCORE TTFF
>
> Garren,
>
> Have you tried TAC32 1.2.7 yet?
>
> Rick
>
>

> -----Original Message-----
> From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Garren Davis
> Sent: Friday, June 05, 1998 12:15 PM
> To: tacgps@tapr.org
> Subject: [TACGPS:1606] Re: ONCORE TTFF
>
>
>
> Rick,
>
> Wow. I'm glad I could be of some help. I'm surprised nobody noticed this
> before.
> I guess most people power up their ONCORE and leave it powered. Can you
> give us an idea when 1.2.7 will be out.
>
> Garren
>
> > ----------
> > From: Richard M. Hambly[SMTP:rick@cnssys.com]
> > Reply To: tacgps@tapr.org
> > Sent: Thursday, June 04, 1998 8:31 PM
> > To: tacgps@tapr.org
> > Subject: [TACGPS:1605] Re: ONCORE TTFF
> >
> > Garren,
> >
> > HOLD THE PRESSES! You have discovered a bug in TAC32!
> >
> > The bug only effects Motorola receivers and has been fixed in 1.2.7, to
> be
> > released soon. In the mean time be sure that you leave your GPS
> receiver
> > on
> > and connected to an antenna for a few minutes before starting TAC32. If
> > the
> > receiver has even one or two satellites locked it will ignore the
> > offending
> > initialization command.
> >
> > Rick
> > WB2TNL
> >
> > -----Original Message-----
> > From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Garren Davis
> > Sent: Thursday, June 04, 1998 12:13 PM
> > To: tacgps@tapr.org
> > Subject: [TACGPS:1604] Re: ONCORE TTFF
> >
> >
> >
> >
> >
> > Rick,
> >
> > Playing around with this a little more I noticed something else. When
> the
> > ONCORE is disconnected from the PC and I start TAC32 and it cannot
> > find the ONCORE it comes up with a message "GPS reciever not found".
> > It asks if I want to probe for a different serial port. When I give it
> the
> > OK
> > the big red "initializing" message in the clock display changes to the
> UTC
> > time. Of course the GPS still cannot be found and the rest of the TAC32
> > display is blank but the true UTC time was put in the clock display in
> big
> > red numbers. Now if I connect the ONCORE and choose edit - set serial
> port
> > TAC32 finds the ONCORE then sets the UTC time to the local PC time.
> >
> > I also noticed that when the ONCORE is connected and TAC32 is started
> > it initializes the ONCORE and puts the correct UTC time up on the
> display
> > but one second later TAC32 changes it back to the local PC time.
> >
> > The UTC time from GPS shows the local PC time.
> > The Display is set to UTC and the big red display shows local PC time.
> > The small PC time window shows local PC time.
> > Using the Motorola program that came with the ONCORE I looked at the UTC
> > setting. It said "UTC time correction = enable". I looked at the GMT

> > setting. It
> > said "GMT correction = 00:00".
> >
> > >From the experiment above it looks to me like TAC32 sets the UTC time
> > correctly
> > unless a brain dead ONCORE is connected. In that case TAC32 sends the
> > ONCORE the correct location information but the wrong time information.
> >
> > If my wording is confusing send me a private EMAIL with your phone
> number
> > and I can call you to explain it more clearly. If you want me to try
> > anything
> > else let me know. I brought me notebook to work.
> >
> > Garren Davis
> > g_davis@qlc.com
> >
> >
> >
> > > ----------
> > > From: Richard M. Hambly[SMTP:rick@cnssys.com]
> > > Reply To: tacgps@tapr.org
> > > Sent: Wednesday, June 03, 1998 9:20 AM
> > > To: tacgps@tapr.org
> > > Subject: [TACGPS:1592] Re: ONCORE TTFF
> > >
> > > Garren,
> > >
> > > Yes and no. TAC32 works with any time you set your PC to so long as
> you
> > > also set your PC's time zone to match. For Win95/98 double click on
> the
> > > time in the lower right corner of your main screen (not TAC32). This
> > > brings
> > > up the system clock. Click on the Time Zone tag, set your time zone
> and
> > > be
> > > sure Automatically adjust clock for daylight savings is checked. This
> > way
> > > TAC32 always knows what UTC is and your PC can use local time.
> > >
> > > Rick
> > > WB2TNL
> > >
> > > -----Original Message-----
> > > From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Garren
> Davis
> > > Sent: Wednesday, June 03, 1998 11:02 AM
> > > To: tacgps@tapr.org
> > > Subject: [TACGPS:1591] Re: ONCORE TTFF
> > >
> > >
> > >
> > >
> > > I had a chance to play with the ONCORE VP and the TAC32 software
> > > last night. It seems to take a long time to acquire the sats after a
> > power
> > > up because the TAC32 software uses the local PC time instead of the
> > > UTC time when it tells the ONCORE where it is and what time it is.
> > >
> > > If I set my PC clock to UTC time then start TAC32 it acquires the sats
> > > very quickly. Is there some UTC correction I am supposed to use in the
> > > TAC32 software?
> > >
> > > Garren
> > > > ----------
> > > > From: Dr Thomas A Clark (W3IWI)[SMTP:clark@tomcat.gsfc.nasa.gov]
> > > > Reply To: tacgps@tapr.org
> > > > Sent: Tuesday, June 02, 1998 10:48 AM
> > > > To: tacgps@tapr.org
> > > > Subject: [TACGPS:1582] Re: ONCORE TTFF
> > > >
> > > > Garren Davis wrote:
> > > > >
> > > > > I have another question about the ONCORE receiver. When I first
> > > > > powered up the ONCORE and started TAC32 it took about a half
> > > > > hour to aquire the sats. I figure it did a cold start. I played
> > with
> > > > it

> > > > > and let it run for a few days then turned it off because I was
> going
> > > > > on vacation. When I powered it back on and started TAC32 it took
> > > > > about a half hour again to aquire the sats. I thought with the
> > onboard
> > > > > battery that it would keep the time and date and therefore would
> > > > > have a faster time to first fix. Is my thinking wrong or am I
> > supposed
> > > > > to give the ONCORE a command to tell it to remember the settings
> > > > > or is this the way the ONCORE is suppose to work?
> > > > >
> > > > > I agree with Rick's comments -- make sure you are not resetting the
> > > > > receiver position. You can see this in the positions window on the
> > main
> > > > > TAC32 screen.
> > > > >
> > > > > A few other factoids: Yes, the purpose of the battery is to keep the
> > > > > on-board clock running so that the receiver "wakes up" knowing the
> > > > > approximate time. There are two other pieces of information it needs
> > > > > to do a "smart start" -- it needs an almanac with Keplerian elements
> > > > > so that it knows which GPS satellites are visible, and it needs to
> > > > > know where you are located. These 3 pieces of information lets your
> > > > > receiver know which satellites to look for.
> > > > >
> > > > > When you power up the receiver, it starts searching for visible
> > > > > satellites by searching the 1023 possible phases of the C/A code
> > > > > for the particular satellite, and by searching in RF frequency based
> > > > > on its predicted Doppler offset. Once the receiver gets code/freq
> > > > > lock, it starts looking for the beginning of the 1500 bit long
> > > > > data message sent at 50 bits/sec -- i.e. beginning every 30 secs.
> > > > > You may have started this step at any time, so the maximum should
> > > > > be 30 sec, minimum zero, and average 15 secs. Finding this boundary
> > > > > lets the rcvr set its clock to a few msec, and it lets it start
> > > > > reading the 1500 bit message. After another 30 secs elapse (assuming
> > > > > there were no dropouts), the receiver has the entire 1500 bit
> message
> > > > > wnich contains all the information needed to use this satellite's
> > > > > data, including a precise set of orbital elements (ephemeris). When
> > > > > 4 satellites are thus found, the receiver can do a position fix.
> > > > > If the 3 assumptions -- approx time+approx location+almanac known --
> > > > > are true and signals are solid, the acquisition time should be 30-60
> > > > > seconds.
> > > > >
> > > > > If you have been locked up, kill the power, and then re-power the
> > > > > receiver, the acquisition time will be faster because the receiver
> > > > > already knows all the ephemeris & status info. This data is changed
> > > > > a couple of times per day; its validity is tested by a "serial
> number"
> > > > > called the IODE (Issue of Data Ephemeris) contained in the 1500 bit
> > > > > message.
> > > > >
> > > > > Now lets consider the situation when one of the three assumptions is
> > > > > not valid. Rick suggested that you make sure that TAC32 knows your
> > > > > approximate position, and TAC32 resets the receiver's location to
> its
> > > > > software default value. If the default is grossly wrong, the
> receiver
> > > > > will be looking at the wrong satellites!
> > > > >
> > > > > In case you have done a cold reset of the receiver, the almanac data
> > > > > will be missing. Each GPS satellite sends down the almanac for the
> > > > > entire constellation in its 1500 bit message. Unfortunately, it
> takes
> > > > > 25 cycles to send all the information (i.e. 12.5 minutes) to reload
> > > > > the receiver's almanac replica.
> > > > >
> > > > > Different receivers handle the coldstart condition differently. In
> > > > > most cases, it they see that the clock has stopped, or that no
> almanac
> > > > > is loaded, they immediately start a "blind" search for satellites.
> > > > > If your receiver has a bogus position and doesn't lock onto some
> > > > > satellites in a few minutes, this also triggers an all-sky, blind
> > > > > search. Since there are 32 possible GPS satellite PRNs, and the
> ONCORE
> > > > > has only 8 channels, it can only try "tuning in" on a quarter of the
> > > > > possible satellites at a time. It sounds like this is what's
> happening
> > > > > to you.
> > > > >

> > > > 73, Tom
> > > >
> > >
> >
>

68. RE: [TACGPS:1641] Re: ONCORE TTFF

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Thu, 11 Jun 1998 12:12:45 -0400
To: <tacgps@tapr.org>
Message-ID: <001301bd9553$c5513660$101161cf@rick.cnssys.com>
Rendered body type: text/plain

Garren,

That is a documentation error going back a few versions. I will fix it in
the next release.

TAC32 used to show that number but it was meaningless because the first
three of the early fields are there to compensate for your system
configuration (they are summed in the UTC Correction box).

The last field is a 1PPS early offset that is combined with the Late offsets
to form the total intentional offset from UTC shown at the bottom. These
offsets allow you to perform special functions like using two clocks to
create a precision gate (on/off) or for comparing the performance of the gps
clock with an atomic clock. Because most users will want the intentional
offsets to be zero there are reset buttons provided for them.

Rick
WB2TNL

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Garren Davis
Sent: Thursday, June 11, 1998 11:31 AM
To: tacgps@tapr.org
Subject: [TACGPS:1641] Re: ONCORE TTFF

Rick,

Yes I tried 1.2.7 and it works great.
I noticed in the HELP section for the "Timing Setup" there is mention of
a display for "Total Early" which shows the sum of the four early offset
controls but I don't see it in the "Timing Setup" window. Am I looking in
the wrong place?

Garren

> ----------
> From: Richard M. Hambly[SMTP:rick@cnssys.com]
> Reply To: tacgps@tapr.org
> Sent: Thursday, June 11, 1998 6:01 AM
> To: tacgps@tapr.org
> Subject: [TACGPS:1640] Re: ONCORE TTFF
>
> Garren,
>
> Have you tried TAC32 1.2.7 yet?
>
> Rick
>
>
> -----Original Message-----
> From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Garren Davis
> Sent: Friday, June 05, 1998 12:15 PM
> To: tacgps@tapr.org
> Subject: [TACGPS:1606] Re: ONCORE TTFF
>
>
>
> Rick,
>
> Wow. I'm glad I could be of some help. I'm surprised nobody noticed this
> before.
> I guess most people power up their ONCORE and leave it powered. Can you
> give us an idea when 1.2.7 will be out.
>

> Garren
>
> > ----------
> > From: Richard M. Hambly[SMTP:rick@cnssys.com]
> > Reply To: tacgps@tapr.org
> > Sent: Thursday, June 04, 1998 8:31 PM
> > To: tacgps@tapr.org
> > Subject: [TACGPS:1605] Re: ONCORE TTFF
> >
> > Garren,
> >
> > HOLD THE PRESSES! You have discovered a bug in TAC32!
> >
> > The bug only effects Motorola receivers and has been fixed in 1.2.7, to
> be
> > released soon. In the mean time be sure that you leave your GPS
> receiver
> > on
> > and connected to an antenna for a few minutes before starting TAC32. If
> > the
> > receiver has even one or two satellites locked it will ignore the
> > offending
> > initialization command.
> >
> > Rick
> > WB2TNL
> >
> > -----Original Message-----
> > From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Garren Davis
> > Sent: Thursday, June 04, 1998 12:13 PM
> > To: tacgps@tapr.org
> > Subject: [TACGPS:1604] Re: ONCORE TTFF
> >
> >
> >
> >
> > Rick,
> >
> > Playing around with this a little more I noticed something else. When
> the
> > ONCORE is disconnected from the PC and I start TAC32 and it cannot
> > find the ONCORE it comes up with a message "GPS reciever not found".
> > It asks if I want to probe for a different serial port. When I give it
> the
> > OK
> > the big red "initializing" message in the clock display changes to the
> UTC
> > time. Of course the GPS still cannot be found and the rest of the TAC32
> > display is blank but the true UTC time was put in the clock display in
> big
> > red numbers. Now if I connect the ONCORE and choose edit - set serial
> port
> > TAC32 finds the ONCORE then sets the UTC time to the local PC time.
> >
> > I also noticed that when the ONCORE is connected and TAC32 is started
> > it initializes the ONCORE and puts the correct UTC time up on the
> display
> > but one second later TAC32 changes it back to the local PC time.
> >
> > The UTC time from GPS shows the local PC time.
> > The Display is set to UTC and the big red display shows local PC time.
> > The small PC time window shows local PC time.
> > Using the Motorola program that came with the ONCORE I looked at the UTC
> > setting. It said "UTC time correction = enable". I looked at the GMT
> > setting. It
> > said "GMT correction = 00:00".
> >
> > >From the experiment above it looks to me like TAC32 sets the UTC time
> > correctly
> > unless a brain dead ONCORE is connected. In that case TAC32 sends the
> > ONCORE the correct location information but the wrong time information.
> >
> > If my wording is confusing send me a private EMAIL with your phone
> number
> > and I can call you to explain it more clearly. If you want me to try
> > anything
> > else let me know. I brought me notebook to work.
> >
> > Garren Davis

> > g_davis@qlc.com
> >
> >
> >
> > > ----------
> > > From: Richard M. Hambly[SMTP:rick@cnssys.com]
> > > Reply To: tacgps@tapr.org
> > > Sent: Wednesday, June 03, 1998 9:20 AM
> > > To: tacgps@tapr.org
> > > Subject: [TACGPS:1592] Re: ONCORE TTFF
> > >
> > > Garren,
> > >
> > > Yes and no. TAC32 works with any time you set your PC to so long as
> you
> > > also set your PC's time zone to match. For Win95/98 double click on
> the
> > > time in the lower right corner of your main screen (not TAC32). This
> > > brings
> > > up the system clock. Click on the Time Zone tag, set your time zone
> and
> > > be
> > > sure Automatically adjust clock for daylight savings is checked. This
> > way
> > > TAC32 always knows what UTC is and your PC can use local time.
> > >
> > > Rick
> > > WB2TNL
> > >
> > > -----Original Message-----
> > > From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Garren
> Davis
> > > Sent: Wednesday, June 03, 1998 11:02 AM
> > > To: tacgps@tapr.org
> > > Subject: [TACGPS:1591] Re: ONCORE TTFF
> > > >
> > > >
> > > >
> > > >
> > > I had a chance to play with the ONCORE VP and the TAC32 software
> > > last night. It seems to take a long time to acquire the sats after a
> > power
> > > up because the TAC32 software uses the local PC time instead of the
> > > UTC time when it tells the ONCORE where it is and what time it is.
> > >
> > > If I set my PC clock to UTC time then start TAC32 it acquires the sats
> > > very quickly. Is there some UTC correction I am supposed to use in the
> > > TAC32 software?
> > >
> > > Garren
> > > > ----------
> > > > From: Dr Thomas A Clark (W3IWI)[SMTP:clark@tomcat.gsfc.nasa.gov]
> > > > Reply To: tacgps@tapr.org
> > > > Sent: Tuesday, June 02, 1998 10:48 AM
> > > > To: tacgps@tapr.org
> > > > Subject: [TACGPS:1582] Re: ONCORE TTFF
> > > > >
> > > > Garren Davis wrote:
> > > > >
> > > > > I have another question about the ONCORE receiver. When I first
> > > > > powered up the ONCORE and started TAC32 it took about a half
> > > > > hour to aquire the sats. I figure it did a cold start. I played
> with
> > > it
> > > > > and let it run for a few days then turned it off because I was
> going
> > > > > on vacation. When I powered it back on and started TAC32 it took
> > > > > about a half hour again to aquire the sats. I thought with the
> > onboard
> > > > > battery that it would keep the time and date and therefore would
> > > > > have a faster time to first fix. Is my thinking wrong or am I
> > supposed
> > > > > to give the ONCORE a command to tell it to remember the settings
> > > > > or is this the way the ONCORE is suppose to work?
> > > > >
> > > > I agree with Rick's comments -- make sure you are not resetting the
> > > > receiver position. You can see this in the positions window on the
> > main
> > > > TAC32 screen.

> > > >
> > > > A few other factoids: Yes, the purpose of the battery is to keep the
> > > > on-board clock running so that the receiver "wakes up" knowing the
> > > > approximate time. There are two other pieces of information it needs
> > > > to do a "smart start" -- it needs an almanac with Keplerian elements
> > > > so that it knows which GPS satellites are visible, and it needs to
> > > > know where you are located. These 3 pieces of information lets your
> > > > receiver know which satellites to look for.
> > > >
> > > > When you power up the receiver, it starts searching for visible
> > > > satellites by searching the 1023 possible phases of the C/A code
> > > > for the particular satellite, and by searching in RF frequency based
> > > > on its predicted Doppler offset. Once the receiver gets code/freq
> > > > lock, it starts looking for the beginning of the 1500 bit long
> > > > data message sent at 50 bits/sec -- i.e. beginning every 30 secs.
> > > > You may have started this step at any time, so the maximum should
> > > > be 30 sec, minimum zero, and average 15 secs. Finding this boundary
> > > > lets the rcvr set its clock to a few msec, and it lets it start
> > > > reading the 1500 bit message. After another 30 secs elapse (assuming
> > > > there were no dropouts), the receiver has the entire 1500 bit
> message
> > > > wnich contains all the information needed to use this satellite's
> > > > data, including a precise set of orbital elements (ephemeris). When
> > > > 4 satellites are thus found, the receiver can do a position fix.
> > > > If the 3 assumptions -- approx time+approx location+almanac known --
> > > > are true and signals are solid, the acquisition time should be 30-60
> > > > seconds.
> > > >
> > > > If you have been locked up, kill the power, and then re-power the
> > > > receiver, the acquisition time will be faster because the receiver
> > > > already knows all the ephemeris & status info. This data is changed
> > > > a couple of times per day; its validity is tested by a "serial
> number"
> > > > called the IODE (Issue of Data Ephemeris) contained in the 1500 bit
> > > > message.
> > > >
> > > > Now lets consider the situation when one of the three assumptions is
> > > > not valid. Rick suggested that you make sure that TAC32 knows your
> > > > approximate position, and TAC32 resets the receiver's location to
> its
> > > > software default value. If the default is grossly wrong, the
> receiver
> > > > will be looking at the wrong satellites!
> > > >
> > > > In case you have done a cold reset of the receiver, the almanac data
> > > > will be missing. Each GPS satellite sends down the almanac for the
> > > > entire constellation in its 1500 bit message. Unfortunately, it
> takes
> > > > 25 cycles to send all the information (i.e. 12.5 minutes) to reload
> > > > the receiver's almanac replica.
> > > >
> > > > Different receivers handle the coldstart condition differently. In
> > > > most cases, it they see that the clock has stopped, or that no
> almanac
> > > > is loaded, they immediately start a "blind" search for satellites.
> > > > If your receiver has a bogus position and doesn't lock onto some
> > > > satellites in a few minutes, this also triggers an all-sky, blind
> > > > search. Since there are 32 possible GPS satellite PRNs, and the
> ONCORE
> > > > has only 8 channels, it can only try "tuning in" on a quarter of the
> > > > possible satellites at a time. It sounds like this is what's
> happening
> > > > to you.
> > > >
> > > > 73, Tom
> > > >
> > >
> > >
> >
>

69. Using the PT5101/78SR Regulator with the GPS-20 Interface Board

From: John Ackermann N8UR <jra@febo.com>
Date: Sun, 14 Jun 1998 15:59:26 -0400
To: tacgps@tapr.org
Message-ID: <199806141959.PAA24089@meow.febo.com>
Rendered body type: text/plain

I want to retrofit a PT-5101 or 78SR regulator instead of the LM2940
in my GPS-20 PWR board to reduce the regulator dissipation. There are

currently a 0.47uF cap on the input side of the 2940, and a 33uF
tantalum on the output side. My early draft of the TAC-2 assembly
manual indicates a couple of extra components are used for the '5101
option, but I'm not sure what was finally decided.

Question 1: what additional components do I need (if any) before
dropping one of these babies in where the 2940 used to be? Question 2:
 is there anything to choose between the PT5101 and the 78SR devices?

John N8UR
jra@febo.com

70. Re: [TACGPS:1643] Using the PT5101/78SR Regulator with the GPS-20 Interface Board

From: "Tom Clark <W3IWI>" <tac@clark.net>
Date: Mon, 15 Jun 1998 02:01:52 +0000
To: tacgps@tapr.org
Message-ID: <35848090.6876E07B@clark.net>
Rendered body type: text/plain

John Ackermann N8UR wrote:

> I want to retrofit a PT-5101 or 78SR regulator instead of the LM2940
> in my GPS-20 PWR board to reduce the regulator dissipation. There are
> currently a 0.47uF cap on the input side of the 2940, and a 33uF
> tantalum on the output side. My early draft of the TAC-2 assembly
> manual indicates a couple of extra components are used for the '5101
> option, but I'm not sure what was finally decided.
>
> Question 1: what additional components do I need (if any) before
> dropping one of these babies in where the 2940 used to be? Question 2:
> is there anything to choose between the PT5101 and the 78SR devices?

John -- the 5101 will directly replace a 7805. It wants a tant/elect cap
acrossits output, but you've already got it there. The recommendation is that a
6 v
zener be placed across the output to "eat" any spikes that might happen.

The 78SR's are higher current and cost more. I found out to my chagrin that
you MUST be careful with the 78SR's -- the pin 1-2-3 ordering seems to
be opposite from the "7805 standard", so when you use them on a TAC2
they should be mounted on the BOTTOM of the PCB.

You can get a data sheet (PDF format) on either from the PowerTrends web
site at
              http://www.powertrends.com/

[Also, they have been know to send free samples!]

73, Tom

71. W5OJM Article in QST

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Mon, 15 Jun 1998 03:51:19 +0000
To: TACGPS <tacgps@tapr.org>
Message-ID: <35849A37.EA1B5FBA@clark.net>
Rendered body type: text/plain

Just got my July QST. I recommend that you all read Brooks Shera's
(W5OJM) article starting on Page 37. It describes in some detail
his GPS-based frequency standard.

Brooks is a member of TACGPS and we had a lot of dialogue on his
approach back around Xmas. I knew he had a QST article in the
works and I'm pleased to see it has now appeared.

Brooks approach is a bit different from the one I've been
working on for the TOC project. He implements a direct PLL
between the GPS 1PPS signal and a replica of the xtal's signal
divided down to ~300 kHz, averaging the phase error for a
30 sec measurement window, and then averaging that error for
a long (variable) time interval. He uses a PIC 16C73 controller
and then drives a low-cost 18-bit DAC to steer the xtal. Nice
design! The article indicates that circuit boards and pre-
programmed 16C73s are available. The other parts are all
available from DigiKey, except for a good xtal, like an
HP10811 which you will have to find at a hamfest or some
other source.

Good show, Brooks!

73, Tom

72. Re: [TACGPS:1644] Re: Using the PT5101/78SR Regulator with the GPS-20 Interface Board

From: John Ackermann N8UR <jra@febo.com>
Date: Mon, 15 Jun 1998 08:06:38 -0400
To: tacgps@tapr.org
Message-ID: <199806151206.IAA26859@meow.febo.com>
Rendered body type: text/plain

Thanks for the info, Tom!

John

In message <35848090.6876E07B@clark.net>, "Tom Clark <W3IWI>" writes:
>
>
>John Ackermann N8UR wrote:
>
>> I want to retrofit a PT-5101 or 78SR regulator instead of the LM2940
>> in my GPS-20 PWR board to reduce the regulator dissipation. There are
>> currently a 0.47uF cap on the input side of the 2940, and a 33uF
>> tantalum on the output side. My early draft of the TAC-2 assembly
>> manual indicates a couple of extra components are used for the '5101
>> option, but I'm not sure what was finally decided.
>>
>> Question 1: what additional components do I need (if any) before
>> dropping one of these babies in where the 2940 used to be? Question 2:
>> is there anything to choose between the PT5101 and the 78SR devices?
>
>John -- the 5101 will directly replace a 7805. It wants a tant/elect cap
>acrossits output, but you've already got it there. The recommendation is that
>a
>6 v
>zener be placed across the output to "eat" any spikes that might happen.
>
>The 78SR's are higher current and cost more. I found out to my chagrin that
>you MUST be careful with the 78SR's -- the pin 1-2-3 ordering seems to
>be opposite from the "7805 standard", so when you use them on a TAC2
>they should be mounted on the BOTTOM of the PCB.
>
>You can get a data sheet (PDF format) on either from the PowerTrends web
>site at
>   http://www.powertrends.com/
>
>[Also, they have been know to send free samples!]
>
>73, Tom
>
>
>

73. W5OJM

From: mdmiller@onramp.net
Date: Mon, 15 Jun 1998 07:09:06 -0500
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980615070906.00820630@199.1.11.3>
Rendered body type: text/plain

All,

I have finished reading Brooks' article "A GPS Based Frequency Standard" in the July issue of QST. His approach to disciplining an oscillator is similar to the methods I have been exposed to in the simulcast paging industry. What I find most appealing about this project is the fact that I can discipline almost all OCXO's that are available to me and can derive statistics about crystal aging. The fact that I can select the loop filter time constant also lends itself to experimentation.

I plan to experiment using my Oncore, TAC, W5OJM board and an OCXO from Oak Frequency Control. As soon as I gather all of the parts for the W5OJM board I will bring these components together and report to the group how things are operating.

I think this subject would be a great seminar at the DCC along with a talk from Brooks digging deeper into the theory of his board.

Thanks Brooks for the very excellent article and project!

73
Mark Miller
N5RFX

74. subscribe

From: "Robert Staley" <BobS@zonge.com>
Date: Thu, 18 Jun 1998 11:04:35 -0700
To: <tacgps@tapr.org>
Message-ID: <000501bd9ae3$8f4417a0$1701a8c0@bobs>
Rendered body type: text/plain

lost my subscription

75. Garmin glitches

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Thu, 18 Jun 1998 19:39:27 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980618193927.00830100@appstate.campus.mci.net>
Rendered body type: text/plain

It appears that occassionally my GPS-30 puts out an extra pulse during the
1 second interval. There will be periods of many hours when it is just
fine. It might be associated with heat, but that is not certain.

The setup is an HC-11 that "captures" the running time counter (a 16 bit
counter running at the 2 Mhz bus speed of the micro) on the rising edge of
the input. The differences between these captures gives the number of 1/2
us "ticks" of the bus. Here is a sample that shows the glitch:

```
2000470
2000470
 200081
1800389
2000469
2000469
```

If the micro's xtal were on-freq (8 Mhz) the count would be exactly 2E6
(give or take the GPS jitter). The 2000470 shows that the xtal is 235 ppm
high (470/2E6). The 200081/1800389 "glitch" means the 1 pps line from the
GPS-30 went low, then high roughly 100 ms into the second, approximately
the pulse width (as measured on the scope). Note that adding the two
"captures" produces 2000470, a figure that looks about right.

If I change the code so that it captures *both* rising and falling edges I
get, roughly, 1800000 and 200000 pairs, as one would expect, but *no*
glitches. This indicates that the glitch is both very near the end of the
1 pps pulse, and short, i.e. too short for the input capture routine (which
takes something of the order of 20 us to execute), but long enough for the
micro to latch it.

The 1 pps goes through a 74HC14, Schmidt trigger invertor. If the falling
edge of the pulse has any jiggles they would have to be substantial.

Another one of those problems to ponder.

Regards,
Don, W4DH

76. Re: [TACGPS:1577] Re: Rhubidium, GPS & Microcontrollers - Steering

From: "Ron L. Sparks" <rls@ibm.net>
Date: Thu, 18 Jun 1998 20:56:43 -0500
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980618205643.007d8b50@pop5.ibm.net>
Rendered body type: text/plain

Don (and everyone else),

Did you see the July issue of QST? There is an article, complete with
boards and pic programs that does EXACTLY what we have been discussing.
Very good article and nice two evening kit.

Check it out. This is definitely the way to get freq locked with your new
Rube.

Ron
KC5ODM

77. Re: [TACGPS:1649] Garmin glitches

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Fri, 19 Jun 1998 03:31:23 +0000
To: tacgps@tapr.org
Message-ID: <3589DB8B.C8A43267@clark.net>
Rendered body type: text/plain

Donald E. Haselwood wrote:
>
> It appears that occassionally my GPS-30 puts out an extra pulse during the
> 1 second interval. There will be periods of many hours when it is just
> fine. It might be associated with heat, but that is not certain.
>
> The setup is an HC-11 that "captures" the running time counter (a 16 bit
> counter running at the 2 Mhz bus speed of the micro) on the rising edge of
> the input. The differences between these captures gives the number of 1/2
> us "ticks" of the bus. Here is a sample that shows the glitch:
>
>   2000470
>   2000470
>   200081
>   1800389
>   2000469
>   2000469

Don -- from your description of your measurement system, the stray
pulse occurs at 0.100000 seconds after the previous pulse, followed
by the next pulse 0.90000 seconds later. The pulse width in the
GPS-20/30 is 0.10000 seconds, so my bet is that your triggering
occasionally on the down-going edge. This can happen if there is
some amount of pulse ringing. You didn't say if the 74HC14 is AC
or DC coupled. If it is DC coupled, and you are feeding a 'nude'
HC14 input pin, you might want to put a 470 ohm or 1k resistor
pulldown from that pin to gnd.

73, Tom

gnd

78. Getting the Rb ready

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Fri, 19 Jun 1998 11:33:18 -0400
To: "TAC-2 mail list" <tacgps@tapr.org>
Message-ID: <000301bd9b97$958302c0$5f1d5c18@john.tampabay.rr.com>
Rendered body type: text/plain

Since most of us have now received our Efratom FRK-L Rube's from Lehman, I
was wondering if we ever made a final decision on exactly which internal
connections to bring out to the multi-pin connector for interfacing to Tom's
forthcoming TOC or to Brooks Shera's controller which appeared in July QST.
I looked back through all messages that I could find on the subject but I
couldn't find where we actually decided on the exact connection points to
bring out. I would like to fire up my Rb for the first time but thought it
would be a good idea to make the modification first so it would be a simple
task to connect it to the GPS controller without having to power down the
Rb. Think it would be a good idea to choose the pins on the multi-pin
connector to use just for the sake of uniformity. Looks like pins X and V
might be a good choice since they don't appear to be used. Any info,
suggestions or comments would be appreciated.

73 John W4SF

79. GPS-25 1pps precision?

From: chrise@n0jcf.com (Chris Elmquist)
Date: Fri, 19 Jun 1998 13:02:05 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <m0yn5UD-000UOEC@n0jcf.com>
Rendered body type: text/plain

Can anyone comment on the precision of the 1pps output from a GPS-25?
Is it better than the GPS-20? Is it the same?

I'm considering an engine for the July QST controller project... and
want to understand what performance differences might be encountered
between the GPS-20 that I already have, a GPS-25, a Moto UT+, or a
Moto VP...

So many choices... :-)

73, Chris

```
--
Chris Elmquist, N0JCF
chrise@n0jcf.com
```

80. Re: [TACGPS:1652] Getting the Rb ready

```
From: chrise@n0jcf.com (Chris Elmquist)
Date: Fri, 19 Jun 1998 12:58:10 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <m0yn5QQ-000UOEC@n0jcf.com>
Rendered body type: text/plain
```

```
John K. Pringle wrote:
>
> Since most of us have now received our Efratom FRK-L Rube's from Lehman, I
> was wondering if we ever made a final decision on exactly which internal
> connections to bring out to the multi-pin connector for interfacing to Tom's
> forthcoming TOC or to Brooks Shera's controller which appeared in July QST.

Of course, I wasn't paying attention when these Rube discussions took place...
and now that the QST article is out, I want one!

Could I bother someone for a replay of what transpired with the Rube's? Was
there a group purchase? a miraculous find at a swap meet? a miraculous
find at a surplus store?  Are there any left?  Any details greatly appreciated.

73, Chris

--
Chris Elmquist, N0JCF
chrise@n0jcf.com
```

81. Re: [TACGPS:1654] Re: Getting the Rb ready

```
From: Tom Van Baak <tvb@veritas.com>
Date: Fri, 19 Jun 1998 12:17:19 -0700
To: tacgps@tapr.org
Message-ID: <358AB93F.46FC@veritas.com>
Rendered body type: text/plain
```

```
Chris Elmquist wrote:
...
> Could I bother someone for a replay of what transpired with the Rube's? Was
> there a group purchase? a miraculous find at a swap meet? a miraculous
> find at a surplus store?  Are there any left?  Any details greatly appreciated.
>
> 73, Chris

There are hundreds of them available. Cheap compact used
surplus Rubidium oscillators can be obtained from $350 to
$700 from the gentlemen below.

/tvb

--------

Wade Lehman has Ball/Efratom FRK-L rubidium oscillators for
sale at $500. Several TAC-GPS members have purchased these.
Contact info:
    Lehman Scientific
    sales@lehmanscientific.com
    http://www.lehmanscientific.com/
    1.800.784.8680


Tom Hamilton has EG&G RFS-10-7 and Efratom M-100 rubidium
oscillators for sale at $695 (or $500 at quantity 10).
Contact info:
    Hamilton Instruments
    TE@worldnet.att.net
    http://www.angelfire.com/biz/telist/
    1.800.862.8983


Corby Dawson also has EG&G RFS-10-7 and Efratom M-100
rubidium oscillators. Price is $425 each, or $375 for
quantity 5, or $350 at quantity 10. Several of us have
purchased Rubidium and Cesium standards from Corby.
Contact info:
    Corby Dawson
    1.805.736.0288
```

Bernie Goetz has Efratom FRS-C rubidium oscillators. At
2x3x4 inches these are about half the size of the M-100
class oscillator. These have 10 MHz TTL output.
Contact info:
    Vigilante Electronics
    sales@vigilante-electronics.com
    http://www.vigilante-electronics.com/
    1.212.243.7964

82. GPS-25 "VAUX" connection?

From: John Ackermann N8UR <jra@febo.com>
Date: Fri, 19 Jun 1998 17:26:21 -0400
To: tacgps@tapr.org
Message-ID: <199806192126.RAA12141@meow.febo.com>
Rendered body type: text/plain

Just replaced a GPS-20 board with a GPS-25 and notice the "VAUX"
connection (pin 7) and the backup battery feature.

It's not clear if the battery is charged from the normal power
connection (pin 10) and VAUX is used only to continue charging when the
main power goes away, or if you need to connect VAUX to charge the
battery, period. If so, is it safe simply to parallel pin 7 with pin
10?

By the way -- I'm using one of the PowerTrends PT-5101 regulators with
this unit. Current draw is about 75mA at 14 volts input, and after an
hour the regulator (with no additional heatsink) is barely warm to the
touch. Much better than the 2940 that made its heatsink almost too hot
to touch!

John N8UR
jra@febo.com

83. Re: [TACGPS:1653] GPS-25 1pps precision?

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Fri, 19 Jun 1998 20:04:29 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980619200429.007ffaa0@appstate.campus.mci.net>
Rendered body type: text/plain

Add the Mot Remote GPS to the list for comments. It looks like its
designed for timing use and ideal for fixed-base operation. I don't how
much it costs, tho.

Regards,
Don

At 01:17 PM 6/19/98 -0500, you wrote:
>Can anyone comment on the precision of the 1pps output from a GPS-25?
>Is it better than the GPS-20? Is it the same?
>
>I'm considering an engine for the July QST controller project... and
>want to understand what performance differences might be encountered
>between the GPS-20 that I already have, a GPS-25, a Moto UT+, or a
>Moto VP...
>
>So many choices... :-)
>
>73, Chris
>--
>Chris Elmquist, N0JCF
>chrise@n0jcf.com
>
>

84. Re: [TACGPS:1650] Re: Rhubidium, GPS & Microcontrollers -

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Fri, 19 Jun 1998 21:40:31 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980619214031.007adc30@appstate.campus.mci.net>
Rendered body type: text/plain

Ron,

I've been waiting for the July issue. (I must be last on the mailing

list!) Brook's project looks excellent. Indeed a nice job. I'll probably build one up...and continue with the HC-11. I find that most of the fun is working through the design, studying the theory, trying it out, sorting out the problems.

My approach is slightly different than Brooks. My scheme is to lock a "crummy" osc to the Rube via a MC145170 PLL chip, plus compare the Rube to the gps. The MC145170 has two divide by N counters (one good into the 150 Mhz range), so one counts the Rube and the other the crummy osc. For crummy osc locking, the phase comparison rate is in the order of 1000 times faster than comparing to the gps at 1 pps as well as comparing to a stable reference, therefore the stability requirements of the steered osc are greatly reduced. What I've got so far is working.

Another approach is to use *two* of Brook's controllers. One to steer the Rube with a long time constant, and another, fed by the Rube (divided down) steers the VXCO (such as the rig's master osc) with a short time constant. This requires an external counter to divide the Rube down to one second (hence the MC145170 approach).

Don, W4DH

85. Re: [TACGPS:1656] GPS-25 "VAUX" connection?

From: Dave Martindale <davem@cs.ubc.ca>
Date: Fri, 19 Jun 1998 22:49:17 -0700
To: tacgps@tapr.org
Message-ID: <l03130300b1b0fc0269f5@[198.162.38.159]>
Rendered body type: text/plain

>Just replaced a GPS-20 board with a GPS-25 and notice the "VAUX"
>connection (pin 7) and the backup battery feature.
>
>It's not clear if the battery is charged from the normal power
>connection (pin 10) and VAUX is used only to continue charging when the
>main power goes away, or if you need to connect VAUX to charge the
>battery, period. If so, is it safe simply to parallel pin 7 with pin
>10?

This is my understanding of the situation, from email discussions with someone at Garmin:

The internal battery will be charged *either* from the main power input or from the VAUX input. If you leave your GPS 25 powered on most of the time, this will keep the backup battery charged and you can ignore VAUX.

However, if you leave your 25 powered off most of the time, with no power applied at all, the battery will eventually discharge. Supplying power to VAUX powers the internal memory and clock and keeps the battery charged when main power is off.

(At least, that's how it's supposed to work. It turns out that my particular GPS 25 does *not* charge the battery through VAUX, and since I've been keeping main power off most of the time, my battery has died. This was apparently a problem with Rev. 10 boards, and has been fixed in current production.)

Dave

86. Oncore versus Garmin RX Sensitivity?

From: John Ackermann N8UR <jra@febo.com>
Date: Sat, 20 Jun 1998 08:19:29 -0400
To: tacgps@tapr.org
Message-ID: <199806201219.IAA00169@meow.febo.com>
Rendered body type: text/plain

I've been having a devil of a time getting good quality results from my older 6-channel Oncore receiver. Today, I temporarily hooked up the GPS-25 that's going into my car to the antenna that the Oncore normally uses (and that I've assumed was the source of my trouble) and was surprised to discover that -- at least over the relatively short inteval I've been monitoring -- the GPS-25 is giving much, much better HDOP readings and a more stable position.

The Oncore works, I see "holes" in the sky where there aren't any obstructions, and over any long observation period the average HDOP is 2.0 or more. So far, the Garmin is locking 7-8 satellites, generating a tight position pattern (on SAWatch) and generating stable HDOP of about 1.1.

I wonder if my Oncore may have something wrong with it, or if the
Garmin is just a much hotter receiver (or could the extra 2 channels in
the Garmin make this much differnce?) Anyone have any thoughts on this?

John N8UR
jra@febo.com

PS - I'm having trouble getting SAWatch to recognize the GPS-25 in
anything other than "generic NMEA" mode, so I can't display the SV
positions. The receiver is outputting the GSA and GSV sentences, but
SAWatch refuses to believe there's a receiver present when I try to set
to GPS-20 or GPS-IIXL modes. Anyone know what's going on?

87. Re: [TACGPS:1660] Oncore versus Garmin RX Sensitivity?

From: Gary Sanders <gsanders@gte.net>
Date: Sat, 20 Jun 1998 14:29:34 -0400
To: tacgps@tapr.org
Message-ID: <358BFF8E.BDA689BA@gte.net>
Rendered body type: text/plain

John Ackermann N8UR wrote:
>
> PS - I'm having trouble getting SAWatch to recognize the GPS-25 in
> anything other than "generic NMEA" mode, so I can't display the SV
> positions. The receiver is outputting the GSA and GSV sentences, but
> SAWatch refuses to believe there's a receiver present when I try to set
> to GPS-20 or GPS-IIXL modes. Anyone know what's going on?

Have you recently run TAC32? If so, that's your problem.

TAC32 turns off all sentences but the one's it wants to see during
initialization, and doesn't turn the sentences back on at exit that
SAWatch wants to see.

SaWatch doesn't turn any sentences on or off during initialization,
so you're left to your own devices to get it to work with SaWatch
after running TAC32.

Get hold of a copy of GPSCFG.EXE (for Windows) or NMEAVWR.exe (for DOS)
from Garmin Tech Support. They aren't big programs, so they can email
them to you. Either can be used to very simply enable and disable
any and all NMEA sentences on your receiver.

Gary Sanders   WB0BZR

88. New Tech Notes Online

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Sat, 20 Jun 1998 13:31:18 -0500
To: " tacgps "<tacgps@tapr.org>
Message-ID: <v04003a0eb1b1b016e0d7@[207.8.125.50]>
Rendered body type: text/plain

Two new tech notes are available

Sorry these were not on-line sooner. They have been sitting in my inbox
since March. Just one too many emergencies since March this year.

Tech-Note #497-1 - Configuration Matrix (12/22/97)
        <ftp://ftp.tapr.org/tapr/gps/motorola/TN-497-1.pdf>

Tech-Note #501 - Oncore I/O Commands (3/2/98)
        <ftp://ftp.tapr.org/tapr/gps/motorola/ TN-501.pdf>

Cheers - Greg

Greg Jones, WD5IVD   Austin, Texas
wd5ivd@tapr.org   http://www.tapr.org/~wd5ivd

Real World, The n.:
        5. Anywhere outside a university. "Poor fellow, he's left UT
Austin and gone into the real world."

89. GPS-25 1pps, ONCORE & Rb comments

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Sat, 20 Jun 1998 20:39:55 +0000
To: tacgps@tapr.org
Message-ID: <358C1E1A.B1C3B8DC@clark.net>
Rendered body type: text/plain

Several questions came up the past few days. I'll try to do a "batch"
answer. I've been slow in replying 'cuz I have been extremely busy
this past week. But I better do it today since I take off next Tues
for 3.5 weeks in Europe.

Chris Elmquist wrote:
>
> Can anyone comment on the precision of the 1pps output from a GPS-25?
> Is it better than the GPS-20? Is it the same?
>
> I'm considering an engine for the July QST controller project... and
> want to understand what performance differences might be encountered
> between the GPS-20 that I already have, a GPS-25, a Moto UT+, or a
> Moto VP...

The GPS-20/30 is a POOR choice for use as an oscillator stabilizer.
As you can see from the plots on my aleph ftp site at

   ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/

the various Garmin plots show that the GPS-20 timing has erratic
jumps at levels ~ 1 usec. Thisw is presumably due to the sequential
receiver re-assigning & reseting its resources whenever it feels like
it. A GPS-20 will most certainly degrade the performance of any
fairly good xtal or Rb that it is used with.

The GPS-25 shows other strange behavior. I'm attaching a .PDF plot
I made last March showing the -25's performance. I took a lot more
data but never got it added to the plot -- sorry. The G-25 shows
ramp-like timing drifts with rates ~ 1:10e111 to 1:10e12. During
the tests I ran, I saw the G-25 drift off UTC by an amount of
up to +/- 10 usec. It would probably work to control the rate
of an xtal down to levels ~1:10e10 or so.

The ONCORE UT+ has not been tested in detail, but should work
about as well as a VP. The VP is my choice over the current UT+
since it has so many other capabilities -- like acting as a DGPS
base station, and being able to "talk" NMEA. I also believe that
the VP version that TAPR is now offering includes Option "C",
which includes a carrier phase output capability. There is some
work in progress which will allow an ONCORE VP with Option C to
generate RINEX files for post-processing at levels of a few cm.

Don Hasselwood added the question
> Add the Mot Remote GPS to the list for comments. It looks like its
> designed for timing use and ideal for fixed-base operation. I don't how
> much it costs, tho.

I believe the original UT is now obsolete, having been replaced
by the UT+ >>EXCEPT<< that Motorola is using the old UTs in their
pod-mounted antenna/rcvr combo which still tests out to be an old UT.
The price of this widget is $500, without cables, without a special
connector that is needed, and without the RS422 => RS232 converter,
power supply interface, etc. that is needed to make it work. IMHO,
it isn't too good of a deal!

Regarding the Rb's, John Pringle asked
> Since most of us have now received our Efratom FRK-L Rube's from Lehman, I
> was wondering if we ever made a final decision on exactly which internal
> connections to bring out to the multi-pin connector for interfacing to Tom's
> forthcoming TOC or to Brooks Shera's controller which appeared in July QST.
> I looked back through all messages that I could find on the subject but I
> couldn't find where we actually decided on the exact connection points to
> bring out. I would like to fire up my Rb for the first time but thought it
> would be a good idea to make the modification first so it would be a simple
> task to connect it to the GPS controller without having to power down the
> Rb. Think it would be a good idea to choose the pins on the multi-pin
> connector to use just for the sake of uniformity. Looks like pins X and V
> might be a good choice since they don't appear to be used. Any info,
> suggestions or comments would be appreciated.

One thing to remember is that Brooks' controller produces a VOLTAGE output.

The only control of the FRK and M-100 Rb's is by injecting a CURRENT into
the "C-field coil". The FRK & M-100 Rb's are slightly different (there was
a LOT of discussion on this topic here on TACGPS about 2 months ago) and
the parts designations and "magic connection points" are slightly different.
I have designed, but have not finished the documentation, on a "suggested
standard Rb interface" so that we all will use the same connector pins, and
can communicate about it sensibly. Alas, I have not had time to modify my
M-100 and FRK units to test it, and hence have not finished the documentation.

In Brooks' QST paper he shows that his unit can be used in the "learning mode"
to compare the oscillator to GPS. I would STRONGLY advise that you spend
some time running it in this mode to see just what level of control is
needed/desired.

Just remember that the short-term stability of the Rb is no better the xtal
inside the Rb. In fact -- it is WORSE! The way that the Rb works is that the
xtal is FMed by ~20-30 Hz at the 6.8 GHz Rb spectral line, and the xtal is
controlled so that the average of the positive and negative frequency
offsets from 6.8 GHz is zero. This modulation (as I recall) is at 127 Hz
in the Efratom units, so you should expect to see 127 Hz FM in the output.
If your goal is to use the oscillator as a frequency standard for microwave
applications, I'd recommend finding a good xtal!

And thanks to Tom Van Baak for the complete list of sources. You had a
couple I was not aware of! Do you have a similar list of people that have
good OCXO xtal oscillators?

73, Tom
[Attachment: G25-Time.PDF; application/pdf; 135,760 bytes]

90. RE: [TACGPS:1662] New Tech Notes Online

From: "Alan Biddle" <APBIDDLE@att.net>
Date: Sat, 20 Jun 1998 22:19:43 -0000
To: <tacgps@tapr.org>
Message-ID: <000001bd9c99$8730e5e0$cb45450c@system>
Rendered body type: text/plain

Real World, The n.:
        6. Mythical land. Found at the end of the Yellow Brick Road.

91. Surplus Rubidium Oscillators

From: Mike Gingell <gingell@vnet.net>
Date: Sat, 20 Jun 1998 18:33:36 +0000 (WAT)
To: tacgps@tapr.org
Message-ID: <Pine.LNX.3.93.980620182451.171E-100000@hypersoft.vnet.net>
Rendered body type: text/plain

I assume that all the Oscillators that are offered on the
market at prices we can afford are "used". The question
comes to mind as to how much longer they can be used.

My main concern is that a rubidium oscillator uses a special rubidium
vapor gas cell which must have a limited life. I assume the ones being
sold are used and have been in service for some years before being
sold on the surplus market. I looked at the specs on the HP5065A
and they indicate a life time of several million hours - i,e, 20 years
or so, although they only offer a 3 year warranty. I imagine
the rubidium cell would cost more than a surplus unit to replace
even assuming one could find a source.

Why are these on the market? Is it because they have been used for
an extended period of time and are changed out as a matter of course
after a certain number of hours. Does anyone have experience of this?

Mike Gingell, KN4BS Raleigh NC, USA   gingell@vnet.net
web site http://users.vnet.net/gingell/vnethome.html

92. Rubidium Lifetimes

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Sun, 21 Jun 1998 00:19:02 +0000
To: TACGPS <tacgps@tapr.org>
Message-ID: <358C5176.301E539B@clark.net>
Rendered body type: text/plain

The question was asked (sorry I hit the delete key before I noted
who asked it) about the lifetime of Rubidium standards.

First, rhe Rb's being discussed are, for the most part, used.
[Aside: A couple of years ago there were some brand new Efratom

M-100's with production dates in the late 80's that appeared on
surplus. Apparently the new units were used by Raytheon in the
encryption units for Patriot missiles. The one I got was still
sealed in its hermetic bag with original factory test notes.]

In general, the Rb standards do not have any "expendable" materials
inside them, except for one light bulb. The Rubidium is in vapor
form in a sealed glass cell. The entire cell is heated and is
inside a 6.8 GHz microwave resonant cavity. A light shines thru
the cell to be detected by a photocell. When the 6.8 GHz RF
precisely matches the hyperfine resonant frequency of Rubidium,
the intensity of the transmitted light drops a little bit. The
xtal oscillator inside the unit is mulktiplied/synthesized to
get a little 6.8 GHz RF energy and the xtal is FM'd ~20 Hz.
A synchronous detector, slaved to the oscillator that is FMing
the xtal gets an error voltage, using the Rb absorption as
an FM discriminator.

So the only "lifetime killers" are the (replaceable) light bulb,
and the fact that part of the innards must operate at an elevated
temperature (which could "cook" some of the parts).

In asking about lifetimes, you may be thinking about Cesium beam
standards. In a Cesium standard, a hot source (much like the
filament heated cathode in a vaccuum tube -- a device that the
modern generation calls a "glowFET") "boils off" metallic Cesium
in a directed beam. The Cesium's ~9.2 GHz hyperfine transition
is detected in a manner similar to that I described for the
Rubuidium. The cell in a Cesium standard does have a finite
lifetime -- often ~ 10 years -- since the Cesium "cathode" is
expended in the process of being boiled away (just like the
cathode in the 4-400's in your KW amplifier has a finite
lifetime).

73, Tom

93. Garmin GPS-30: 1pps phase, a jitter

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Sat, 20 Jun 1998 20:28:14 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980620202814.007d47e0@appstate.campus.mci.net>
Rendered body type: text/plain

Does the GPS-30 sync the 1 pps pulses to the time? I thought it did, but
my results raise some doubt.

My program outputs the phase difference between the Rube and the GPS-30 in
terms of micro's 1/2 us bus "ticks". I was putting out 60 second averages.
 The next day, around noon, with a bright sun, the GPS-30 got heat-stroke
and stalled. Later, it started back up. TAC32 was looking just fine, but
my test setup was now displaying a phase difference roughly 200 us earlier
than before.

Before the GPS konked out, the plot shows the Rube drift *very* clearly--a
regression came up with 4E-11 (freq err with std dev 1E-13). That all
looks right. The drift after the konk-out looks about the same (but I
don't have many hours of data). It looks like the GPS-30 recovered with a
different 1 pps phase.

This happened a few days ago (cloudy wx in between), but I dismissed it as
a bug with my program and added some more output fields to double check.
The data look correct.

If I pull the plug on the (not-heat-stroked) GPS-30 power for a minute or
so, then plug it back in, the Rube-gps phase is still the same (within a
1/2 us, give or take a little jitter) after it locks, just as expected.
Maybe after recovering from heat stroke the GPS-30 needs a reset or
power-down cycle...

The jitter on the plots surprised me. Even with 60 sec averages I expected
the noise to look random. Instead the last plot (appprox 20 hours
duration) shows a string of saw-tooths, followed by one slow rising
saw-tooth, a couple of nice square waves, then more saw-tooths but reversed
(fast rise, slow fall). The pk-pk amplitude is roughly 1 us for all of
this "noise." Do you think this is coming from the GPS-30 as it "tinkers
with the locking," or SA?

Regards,
Don, W4DH

94. Re: [TACGPS:1665] Surplus Rubidium Oscillators

From: Steve Sampson <ssampson@usa-site.net>
Date: Sat, 20 Jun 1998 20:47:06 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199806210147.UAA14731@access.usa-site.net>
Rendered body type: text/plain

> Why are these on the market? Is it because they have been used for
> an extended period of time and are changed out as a matter of course
> after a certain number of hours.

As a military contractor, I can say we dump everything the Government gives us as GFE (Government Furnished Equipment) when we lose a contract, or complete the contract. These piles (pallets) of stuff are returned to the Program Managers who have no clue (or space) what to do with them, and they then give them to DRMO (Defense Reutilization Management Office) who then sells the pallet to the highest bidder. The government doesn't consider worth, only security. Rb devices are standard equipment in almost all SS radios the military uses. Normally they aren't changed out, but they may have failed some spec (the color of the attached card changes for rejects), maybe even a burned out light-bulb :-) Most of the people selling these do check them out pretty good I hear.

Steve
TRW

95. Re: [TACGPS:1667] Garmin GPS-30: 1pps phase, a jitter

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Sun, 21 Jun 1998 02:06:19 +0000
To: tacgps@tapr.org
Message-ID: <358C6A9B.AFD0BBE2@clark.net>
Rendered body type: text/plain

Donald E. Haselwood wrote:
>
> Does the GPS-30 sync the 1 pps pulses to the time? I thought it did, but
> my results raise some doubt.
>
> My program outputs the phase difference between the Rube and the GPS-30 in
> terms of micro's 1/2 us bus "ticks". I was putting out 60 second averages.
> The next day, around noon, with a bright sun, the GPS-30 got heat-stroke
> and stalled. Later, it started back up. TAC32 was looking just fine, but
> my test setup was now displaying a phase difference roughly 200 us earlier
> than before.

I wonder if, perhaps, you took a "hit" on the counter that is dividing the Rb down to 1PPS.

> Before the GPS konked out, the plot shows the Rube drift *very* clearly--a
> regression came up with 4E-11 (freq err with std dev 1E-13). That all
> looks right. The drift after the konk-out looks about the same (but I
> don't have many hours of data). It looks like the GPS-30 recovered with a
> different 1 pps phase.

Or the Rb's counter glitched.

> This happened a few days ago (cloudy wx in between), but I dismissed it as
> a bug with my program and added some more output fields to double check.
> The data look correct.
>
> If I pull the plug on the (not-heat-stroked) GPS-30 power for a minute or
> so, then plug it back in, the Rube-gps phase is still the same (within a
> 1/2 us, give or take a little jitter) after it locks, just as expected.
> Maybe after recovering from heat stroke the GPS-30 needs a reset or
> power-down cycle...
>
> The jitter on the plots surprised me. Even with 60 sec averages I expected
> the noise to look random. Instead the last plot (appprox 20 hours
> duration) shows a string of saw-tooths, followed by one slow rising
> saw-tooth, a couple of nice square waves, then more saw-tooths but reversed
> (fast rise, slow fall). The pk-pk amplitude is roughly 1 us for all of
> this "noise." Do you think this is coming from the GPS-30 as it "tinkers
> with the locking," or SA?

Don, again I implore you to take a look at the several plots contained in the three gar*.zip files on aleph at

    ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/

These were taken with a GPS-20, but it should be the same as your -30.
In the gar-long.zip file you will see the results of 2 WEEKS of continuous
measurements. The absolute extrema of all these measurements fit in a +/- 2
usec
window. I NEVER saw ANY 200 usec excursions. The G-20 shows LOTS of 1 usec
jumps,
and it is this performance that I assert makes the G-20 be unacceptable for any
precise timing or oscillator steering tasks. If you follow the "jumps"
carefully
you will see that they happen when the receiver adds or deletes or loses lock
or
recovers lock on a satellite.

The short-term (i.e. a couple of minutes) "sawtooth" behavior with the G-20
running
in 2-D mode is seen in the short-2d.gif plot. The performance in 2D & 3D mode
over a few hours can be seen in the garm-2d.gif and garm-3d.gif plots.

What you describe on jitter performance sounds exactly like I would have
expected
from the GPS-20 "toy" receiver. I think you'll be amazed at the difference if
you
replace the -20 with a "real" receiver (like an ONCORE).

73, Tom

96. Re: [TACGPS:1663] GPS-25 1pps, ONCORE & Rb comments

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Sat, 20 Jun 1998 22:08:28 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980620220828.007d5830@appstate.campus.mci.net>
Rendered body type: text/plain

Tom,

My msg on the GPS-30 1pps & jitter crossed with your comments. I think
your comments answer the questions about jitter (the heat-stroke recovery
may be different) .

>The GPS-20/30 is a POOR choice for use as an oscillator stabilizer.
>As you can see from the plots on my aleph ftp site at
>
>   ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/
>
>the various Garmin plots show that the GPS-20 timing has erratic
>jumps at levels ~ 1 usec. Thisw is presumably due to the sequential
>receiver re-assigning & reseting its resources whenever it feels like
>it. A GPS-20 will most certainly degrade the performance of any
>fairly good xtal or Rb that it is used with.

Your GAR-LONG.GIF looks a lot like my plot, except I have the 4E-11 freq
diff that puts a ramp on the data.

>The ONCORE UT+ has not been tested in detail, but should work

Something I saw *suggested* that it might be cheaper than the VP (but the
TAPR purchase may offset that).

>If your goal is to use the oscillator as a frequency standard for microwave
>applications, I'd recommend finding a good xtal!

Thinking of a putting a surplus 10 Ghz surplus rig on ssb, my goal is to
lock the xtal in the rig to the Rb with loop time constant that is slow so
that it suppresses the 127 Hz FMing, but controls the drift of the osc.
BTW, the 127 Hz signal is why the power supply ripple spec, i.e. 120 Hz, is
so critical (making those Sony switching supplies an even better choice :).

Thanks for the 20 - 30 Hz @ 6 Ghz FM figure. The FRK manual doesn't
mention the deviation. At 10 Mhz that that translates to really small
deviation! It looks like some specmanship in the signal/noise figure,
however (">120db in 1Hz band at more than 200 Hz from nominal
frequency")--the spec avoids the first spectral line of the 127 Hz fm'ing
"noise"!

Regards,

Don, W4DH

97. Re: [TACGPS:1660] Oncore versus Garmin RX Sensitivity?

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Sun, 21 Jun 1998 02:37:14 +0000
To: tacgps@tapr.org
Message-ID: <358C71DA.716644CC@clark.net>
Rendered body type: text/plain

John Ackermann N8UR wrote:
>
> I've been having a devil of a time getting good quality results from my
> older 6-channel Oncore receiver. Today, I temporarily hooked up the
> GPS-25 that's going into my car to the antenna that the Oncore normally
> uses (and that I've assumed was the source of my trouble) and was
> surprised to discover that -- at least over the relatively short
> inteval I've been monitoring -- the GPS-25 is giving much, much better
> HDOP readings and a more stable position.
>
> The Oncore works, I see "holes" in the sky where there aren't any
> obstructions, and over any long observation period the average HDOP is
> 2.0 or more. So far, the Garmin is locking 7-8 satellites, generating
> a tight position pattern (on SAWatch) and generating stable HDOP of
> about 1.1.

John -- what firmware version is in the ONCORE? If it happenes to be version 4 or earlier, I'm not surprised. The earliest PVT6s (the first one I tried was in the 3.x days, circa 1993) were quite disappointing. The same hardware became much more competent with release 5.x and 6.x firmware. (FYI -- The latest 8-channel ONCORE firmware is 10.x, and most of the TAPR-supplied units were 8.8).

How do you have the satellite selection configured (best PDOP? Best HDOP? Highest in Sky?)? If it is set for PDOP, then it is trying to get the best 6 satellites for geometry, which means that it is probably trying for some very low elevation satellites, which are probably buried in the trees. If you are wasting rcvr channels trying to get satellites in the trees, raise the elevation limit. Or try the "Highest in Sky" option (in which case the elevation cutoff is essentially irrelevant).

When the satellites lock up, what kind of S/N do you see. On all the ONCOREs I've used, I expect to see S/N of 30 (and often 33) for high elevation satellites. If you are in the low 20's, then you either have a poor antenna, or a lot of coax cable loss, or a totally shielded QTH, or severe RFI.

Since the GPS CA code is only 1023 bits long, the intrinsic "spreading gain" is about 30 dB. If you go thru the arithmetic, you will find that the intrinsic dynamic range of ANY CA-code GPS receiver is in the 23-25 dB range. If you start with the strongest signals having less than about 25 dB S/N, then the weakest satellites that could/should be detected have nearly zero S/N. The ONCOREs will hold lock and track with a reported S/N of ~7-8 dB.

I have been very impressed with the RF performance of the 12-channel Garmin engine (GPS-II+, GPS-III and G-25 are the ones I've tried). Their acquisition performance looks a bit better than the ONCORE, and the (Kalman?) filter they have in their tracking loops follows drop-outs very well. I'd have to rate their RF performance as 1-2 dB better than the best of the ONCOREs.

I mentioned the RFI problem -- this is a distinct possibility for you to check on. It turns out that the 2nd harmonic of UHF TV channels 66-67 is very close to the GPS frequency. Here in this area, 67 is a high-powered PBS station in north-west Baltimore and many rcvrs often fail in the area. I believe that you have 66 in the Columbus area -- it's a possibility that you are be de-sensed. If this is the problem, it is often due to things outside your receiver. For example, the GPS wavelength is ~20 cm, so a half-wave dipole is ~10 cm (4 inches) long. If there are any such pieces of metal around, and if they happen to have a cruddy connection that makes a diode in them, then they could act as an external frequency doubler. You may recall that a frequent source of 144/220/432 MHz RFI are the metal diagonal braces on the cross-arms on telephone & power poles. The 2 pieces of metal are held to the pole by a drive-in bolt, and have a possible poor electrical connection at their junction. The RFI that results from these often goes away when it rains (the moisture making whatever salt is in the corrosion become more conductive), and get worse when it gets dry, and especially after a wind (that can loosen the already poor connection). So if you are near a channel 66-67 TV station, be

advised that poor GPS performance may not be the fault of your GPS
rcvr.

73, Tom

73, Tom

98. Re: [TACGPS:1669] Re: Garmin GPS-30: 1pps phase, a jitter

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Sat, 20 Jun 1998 23:25:24 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980620232524.007dbe60@appstate.campus.mci.net>
Rendered body type: text/plain

Tom,

Thanks for the response.

>I wonder if, perhaps, you took a "hit" on the counter that is dividing the Rb
>down to 1PPS.
>Or the Rb's counter glitched.

The one of the MC145170 counters divides the Rb by 10,000, and the HC-11
counts 1000 interrupts before storing the running time counter. Missing an
interrupt on the HC-11 is 1 ms, far too much of a change. A hit on the
MC145170 counter *could* do it, but why would it coincide with the GPS-30
konking out... Your thought is worth some investigation. The Rb 1 pps
counts (i.e. Rb v micro's xtal) should be constant throughout. If not,
then the Rb counter glitched.

Regards,

Don, W4DH

99. Re: [TACGPS:1671] Re: Oncore versus Garmin RX Sensitivity?

From: John Ackermann N8UR <jra@febo.com>
Date: Sun, 21 Jun 1998 07:47:55 -0400
To: tacgps@tapr.org
Message-ID: <199806211147.HAA09107@meow.febo.com>
Rendered body type: text/plain

Tom wrote, in response to my question about poor performance from the
Oncore:

> John -- what firmware version is in the ONCORE? If it happenes to be
> version 4 or earlier, I'm not surprised. The earliest PVT6s (the first
> one I tried was in the 3.x days, circa 1993) were quite disappointing.
> The same hardware became much more competent with release 5.x and 6.x
> firmware. (FYI -- The latest 8-channel ONCORE firmware is 10.x, and
> most of the TAPR-supplied units were 8.8).

It appears to be 5.0. Is there any point to upgrading from that
version? (BTW -- I bought this receiver from Bdale a few years ago --
it was an eval kit from the AMSAT group purchase).

>
> How do you have the satellite selection configured (best PDOP? Best HDOP?
> Highest in Sky?)? If it is set for PDOP, then it is trying to get the best
> 6 satellites for geometry, which means that it is probably trying for
> some very low elevation satellites, which are probably buried in the
> trees. If you are wasting rcvr channels trying to get satellites in the
> trees, raise the elevation limit. Or try the "Highest in Sky" option
> (in which case the elevation cutoff is essentially irrelevant).

Aha... this was at least part of it. I was looking for best PDOP and
switched to highest in sky -- this got me back to tracking 6 birds. I
woulda thought that even in PDOP mode, the unit would make its
selections from those SVs that it was able to track, and not include
the ones that it couldn't see. Silly me.

> When the satellites lock up, what kind of S/N do you see. On all the
> ONCOREs I've used, I expect to see S/N of 30 (and often 33) for high
> elevation satellites. If you are in the low 20's, then you either
> have a poor antenna, or a lot of coax cable loss, or a totally shielded
> QTH, or severe RFI.
>
> Since the GPS CA code is only 1023 bits long, the intrinsic "spreading
> gain" is about 30 dB. If you go thru the arithmetic, you will find that

> the intrinsic dynamic range of ANY CA-code GPS receiver is in the 23-25
> dB range. If you start with the strongest signals having less than about
> 25 dB S/N, then the weakest satellites that could/should be detected have
> nearly zero S/N. The ONCOREs will hold lock and track with a reported
> S/N of ~7-8 dB.

I typically see S/N of 30-33 on the highest birds (well, right now the
best I'm seeing is 28) and near the horizon I see from 17 through the
low 20's. The thing that was driving me nuts was the "holes" I was
seeing in the sky, where birds weren't being tracked though I knew
there was no obstruction. Hopefully the satellite selection will fix
that.

Thanks for all the info, Tom!

John

100. RE: [TACGPS:1661] Re: Oncore versus Garmin RX Sensitivity?

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sun, 21 Jun 1998 08:35:18 -0400
To: <tacgps@tapr.org>
Message-ID: <000701bd9d11$0c55db00$101161cf@rick.cnssys.com>
Rendered body type: text/plain

Just a note to let everyone know that this particular problem is scheduled
to be fixed in the next version of TAC32.

Rick
WB2TNL

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Gary Sanders
Sent: Saturday, June 20, 1998 2:32 PM
To: tacgps@tapr.org
Subject: [TACGPS:1661] Re: Oncore versus Garmin RX Sensitivity?

John Ackermann N8UR wrote:
>
> PS - I'm having trouble getting SAWatch to recognize the GPS-25 in
> anything other than "generic NMEA" mode, so I can't display the SV
> positions. The receiver is outputting the GSA and GSV sentences, but
> SAWatch refuses to believe there's a receiver present when I try to set
> to GPS-20 or GPS-IIXL modes. Anyone know what's going on?

Have you recently run TAC32? If so, that's your problem.

TAC32 turns off all sentences but the one's it wants to see during
initialization, and doesn't turn the sentences back on at exit that
SAWatch wants to see.

SaWatch doesn't turn any sentences on or off during initialization,
so you're left to your own devices to get it to work with SaWatch
after running TAC32.

Get hold of a copy of GPSCFG.EXE (for Windows) or NMEAVWR.exe (for DOS)
from Garmin Tech Support. They aren't big programs, so they can email
them to you. Either can be used to very simply enable and disable
any and all NMEA sentences on your receiver.

Gary Sanders   WB0BZR

101. Re: [TACGPS:1674] Re: Oncore versus Garmin RX Sensitivity?

From: Gary Sanders <gsanders@gte.net>
Date: Sun, 21 Jun 1998 11:08:42 -0400
To: tacgps@tapr.org
Message-ID: <358D21FA.A3E9D765@gte.net>
Rendered body type: text/plain

Rick,

THANK YOU!!!

I, for one, will be very happy to see this solution.

Gary Sanders

Richard M. Hambly wrote:

>
> Just a note to let everyone know that this particular problem is scheduled
> to be fixed in the next version of TAC32.
>
> Rick
> WB2TNL
>
> -----Original Message-----

> John Ackermann N8UR wrote:
> >
> > PS - I'm having trouble getting SAWatch to recognize the GPS-25 in
> > anything other than "generic NMEA" mode, so I can't display the SV
> > positions.

102. Re: [TACGPS:1675] Re: Oncore versus Garmin RX Sensitivity?

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Sun, 21 Jun 1998 17:07:20 +0000
To: tacgps@tapr.org
Message-ID: <358D3DC8.5A7746B5@clark.net>
Rendered body type: text/plain

Gary Sanders wrote:
>
> Rick,
>
> THANK YOU!!!
>
> I, for one, will be very happy to see this solution.
>
> Gary Sanders
>
> Richard M. Hambly wrote:
> >
> > Just a note to let everyone know that this particular problem is scheduled
> > to be fixed in the next version of TAC32.
> >
> > Rick
> > WB2TNL
> >
> > John Ackermann N8UR wrote:
> > >
> > > PS - I'm having trouble getting SAWatch to recognize the GPS-25 in
> > > anything other than "generic NMEA" mode, so I can't display the SV
> > > positions.

Personally, IMHO, >>ANY<< program that requires a programable feature (like
specific NMEA messages) has the responsibility to turn on the features it needs
and in turn has the authority to disable those it doesn't need.

Tom

103. Rb steering

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Sun, 21 Jun 1998 15:18:34 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980621151834.0084e7b0@appstate.campus.mci.net>
Rendered body type: text/plain

Does anyone know the values of R10 and R11 on the FRK-L Rb's? The values
are not given on the schematic, suggesting that these were selected. I
haven't ripped my unit open (I want to make sure everything else is working
first, so when I put it back together I can check that it still works).

For the FRK-L units it looks like connecting the 0 - 5v steering voltage
through "a rather large resistor" to the point marked "Optional remote
frequency adjust, 9" [not 8 which is +20 supply] would be sufficient to
trim the frequency. It would "bleed" off a small amount of current that
would otherwise go through the field coil. The value for the "rather large
resistor" is a function of R10 and R11. The frequency trimmer pot (R25, 1K)
might have to be "offset" a bit to compensate.

Which does the frequency move when the field magnet current increases?

Regards,

Don, W4DH

104. Re: [TACGPS:1627] Re: Some GPS-30 experiences

From: Lyle Johnson <lylej@azstarnet.com>
Date: Sun, 21 Jun 1998 11:41:49 -0700
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980621114149.008b7b10@pop.azstarnet.com>
Rendered body type: text/plain

At 06:29 AM 6/9/98 -0500, you wrote:
>On Mon, 8 Jun 1998, Donald E. Haselwood wrote:
>
>> I find the GPS-30 quits when it gets hot.
>
>If it is exposed to the sun, paint it white. You wont believe the
>difference.. It will be quite cooler...
>

Be sure to use non-metallic paint! :-)

Lyle

105. Re: [TACGPS:1676] Re: Oncore versus Garmin RX Sensitivity?

From: Dave Martindale <davem@cs.ubc.ca>
Date: Sun, 21 Jun 1998 14:02:54 -0700
To: tacgps@tapr.org
Message-ID: <l03130302b1b324054a57@[198.162.38.159]>
Rendered body type: text/plain

>Personally, IMHO, >>ANY<< program that requires a programable feature (like
>specific NMEA messages) has the responsibility to turn on the features it needs
>and in turn has the authority to disable those it doesn't need.

That's a reasonable approach for TAC32 to take, since it knows it is talking
to Motorola or Garmin board-level receivers that do have programmable NMEA
sentences.

But SA Watch is primarily used with handhelds that output NMEA, and which
do *not* have programmable NMEA sentence selection at all, or where the
sentences sent are programmed via the GPS-human interface. In either
case, SA Watch can't do anything. If a board-level receiver is set to
transmit the sentences that SA Watch needs, then it works well with this
software too. The problem comes when a board-level receiver hasn't
been programmed appropriately.

So whose responsibility is it to get the programming right? Should SA Watch
contain code to detect the fact that it's talking to a board receiver
and reprogram it? (Then it would support only certain receivers). Should
TAC32 restore the initial configuration when it exits? Or should the
user just write some scripts that reprogram the unit to one of several
modes depending on how it will be used next? Any of these will work,
and there are arguments in favour of all three.

        Dave

106. Re: [TACGPS:1676] Re: Oncore versus Garmin RX Sensitivity?

From: Gary Sanders <gsanders@gte.net>
Date: Sun, 21 Jun 1998 17:39:36 -0400
To: tacgps@tapr.org
Message-ID: <358D7D98.C99C3295@gte.net>
Rendered body type: text/plain

I agree. I think this is a reasonable expectation of GPS software,
especially in the case of software that has GPS brand and model
specific setup options. This should be done as part of the
initialization for that specific model.

Unfortunately, not all authors recognize that problems arise if
this isn't done.

Rick does, and is trying to address a problem that isn't really
of his making.

Hopefully, a later release of SAWatch will consider this issue
and address it, although I haven't had any indication either way.

Gary Sanders   WB0BZR

Dr Thomas A Clark (W3IWI) wrote:
>

> Personally, IMHO, >>ANY<< program that requires a programable feature (like
> specific NMEA messages) has the responsibility to turn on the features it needs
> and in turn has the authority to disable those it doesn't need.
>
> Tom

107. Re: [TACGPS:1679] Re: Oncore versus Garmin RX Sensitivity?

From: Gary Sanders <gsanders@gte.net>
Date: Sun, 21 Jun 1998 17:58:50 -0400
To: tacgps@tapr.org
Message-ID: <358D821A.92AA422E@gte.net>
Rendered body type: text/plain

In the case of SAWatch, it already has setup selections for Garmin board
level receivers among others, so it wouldn't need to do any real-time
detection - if the GPS 20 were selected, for instance, it should
automatically turn on and off the appropriate sentences for that
receiver at program start. Ditto for other programmable receivers.

Obviously, for those receivers that don't have the ability to
have sentences enabled or disabled, no action would have to be
(or could be) taken.

Gary Sanders   WB0BZR

Dave Martindale wrote:
>
> So whose responsibility is it to get the programming right? Should SA Watch
> contain code to detect the fact that it's talking to a board receiver
> and reprogram it? (Then it would support only certain receivers). Should
> TAC32 restore the initial configuration when it exits? Or should the
> user just write some scripts that reprogram the unit to one of several
> modes depending on how it will be used next? Any of these will work,
> and there are arguments in favour of all three.
>
>   Dave

108. Re: [TACGPS:1679] Re: Oncore versus Garmin RX Sensitivity?

From: Phil Reed <pcr@ic.net>
Date: Sun, 21 Jun 1998 22:26:30 -0400
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19980621222630.00c3546c@ic.net>
Rendered body type: text/plain

At 04:09 PM 6/21/98 -0500, Dave Martindale wrote:

>So whose responsibility is it to get the programming right? Should SA Watch
>contain code to detect the fact that it's talking to a board receiver
>and reprogram it?

It's always been my view that any program is responsible for setting up its
own devices as it needs. That avoids this kind of problem entirely.

...phil

109. Re: [TACGPS:1679] Re: Oncore versus Garmin RX Sensitivity?

From: "Steve Sampson" <ssampson@usa-site.net>
Date: Sun, 21 Jun 1998 22:38:57 -0500
To: <tacgps@tapr.org>
Message-ID: <003a01bd9d8f$49f02140$87228cd1@dodge.usa-site.net>
Rendered body type: text/plain

>So whose responsibility is it to get the programming right? Should SA Watch
>contain code to detect the fact that it's talking to a board receiver
>and reprogram it?

Depends on where you're headed. If your program is finished,
then no. If you are going to support engines in the future, then yes.

>Should TAC32 restore the initial configuration when it exits?

My personal desire, would be that my engine be left in some
factory default mode. That it be put there on startup, modified
as needed, and then put there again when the program ends.
I don't care how long it takes to initialize, but I don't want to
find out six months later that some program switched off a

feature and it's been defective ever since.

Use a data structure, INI file, config file, or registry to keep track.

Steve

110. VP Input Delay

From: "Pete Prossen" <prossen@znet.com>
Date: Sun, 21 Jun 1998 20:56:45 -0700
To: <tacgps@tapr.org>
Message-ID: <199806220401.VAA10243@sd.znet.com>
Rendered body type: text/plain

To Rick Hambly
(or anyone else who might know)

Would a delay of about 1.2 milliseconds (one byte time at 9600 bps) between
the COM port output and the Oncore VP receiver input cause any degradation
in the performance of TAC32?

No delay in the VP output path, by the way.

Thanks

Pete Prossen
WA6ZUH

111. RE: [TACGPS:1684] VP Input Delay

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Mon, 22 Jun 1998 07:36:00 -0400
To: <tacgps@tapr.org>
Message-ID: <000201bd9dd1$ee3c5920$101161cf@rick.cnssys.com>
Rendered body type: text/plain

Pete,

No, this should not cause any problem.

Rick
WB2TNL

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Pete Prossen
Sent: Monday, June 22, 1998 12:02 AM
To: tacgps@tapr.org
Subject: [TACGPS:1684] VP Input Delay

To Rick Hambly
(or anyone else who might know)

Would a delay of about 1.2 milliseconds (one byte time at 9600 bps) between
the COM port output and the Oncore VP receiver input cause any degradation
in the performance of TAC32?

No delay in the VP output path, by the way.

Thanks

Pete Prossen
WA6ZUH

112. RE: [TACGPS:1677] Rb steering

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Mon, 22 Jun 1998 10:15:34 -0400
To: <tacgps@tapr.org>
Message-ID: <000001bd9de8$389f9d40$5f1d5c18@john.tampabay.rr.com>
Rendered body type: text/plain

Don --

I believe R10 and R11 are selected at the factory to put R25 in the middle
of its range when the current in the C-field coil is correct to put the Rb
on frequency. My schematic does not show pin 8 of TB1 connected to +20v. An
external resistor connected between pins 8 and 9 would shunt the R10/R11/R25
network and change the C-field current. This current is derived from the
voltage source on pin 4. The steering must be current driven, as Tom has
pointed out. I thought about inserting a bipolar transistor as a current

regulator in the C-field current loop and then biasing the base of the transistor with a control voltage to bring the C-field current to the same value it was before inserting the transistor. The steering "voltage" from the GPS controller would also be applied to the base of this "current" regulator through an appropriate resistor network. I think Tom may have an even better idea. Let's wait and see.

73 John W4SF

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Donald E. Haselwood
Sent: Sunday, June 21, 1998 3:20 PM
To: tacgps@tapr.org
Subject: [TACGPS:1677] Rb steering

Does anyone know the values of R10 and R11 on the FRK-L Rb's? The values are not given on the schematic, suggesting that these were selected. I haven't ripped my unit open (I want to make sure everything else is working first, so when I put it back together I can check that it still works).

For the FRK-L units it looks like connecting the 0 - 5v steering voltage through "a rather large resistor" to the point marked "Optional remote frequency adjust, 9" [not 8 which is +20 supply] would be sufficient to trim the frequency. It would "bleed" off a small amount of current that would otherwise go through the field coil. The value for the "rather large resistor" is a function of R10 and R11. The frequency trimmer pot (R25, 1K) might have to be "offset" a bit to compensate.

Which does the frequency move when the field magnet current increases?

Regards,

Don, W4DH

113. Re: [TACGPS:1686] RE: Rb steering

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Mon, 22 Jun 1998 14:52:04 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980622145204.007f05a0@appstate.campus.mci.net>
Rendered body type: text/plain

John,

Your are right! Pin 8 of TB1 does not go to +20, but goes to +20 thru R10 (when R10 is in the remote freq adjust position). I was thinking along the lines of leaving R10 in-place so that the Rb trims normally, then tweaking the field magnet current from the controller via pin 9 and resistor.

For control purposes the voltage v current issue is one semantics. (The Rb cell responds to the magnetic field, hence the current through winding is the key.) The current is set by +20v across the resistor network and coil resistance which produces the correct current for the field magnet. This current could be "trimmed" via a resistor connect to pin 9, and driven from a voltage. My guess is that the current variation needed is quite small (otherwise R25 would be much smaller, and R10 & R11 would not be selected).

I have some concern about introducing errors & noise. For steering, it is desirable for the Rb to have low sensitivity to the remote steering voltage. This reduces the problem of variations in the dac output voltage (or current). (The effect of ground loops & noise pickup also are reduced.) It looks to me like the major unintended variation of the dac output will come from the voltage regulators--something of the order of 0.1% could be expected (the dac is less temp sensitive, i.e. the specs show 25 ppm FSR/deg C, and at midpoint it'd be halved). If the controller changes temp, then there is a small shift in the dac voltage, which then changes the Rb, which after a period of time gets removed by the feedback loop. Until the loop corrects, the Rb is off-freq slightly. The penalty of low sensitivity is that the range of remote control is limited--one might have to give R25 a tweak once in a (long) while.

When my current Rb v GPS comparison run is done, I'll rip open the Rb and take a look.

Regards,

Don, W4DH

>I believe R10 and R11 are selected at the factory to put R25 in the middle
>of its range when the current in the C-field coil is correct to put the Rb
>on frequency. My schematic does not show pin 8 of TB1 connected to +20v. An
>external resistor connected between pins 8 and 9 would shunt the R10/R11/R25
>network and change the C-field current. This current is derived from the
>voltage source on pin 4. The steering must be current driven, as Tom has
>pointed out. I thought about inserting a bipolar transistor as a current
>regulator in the C-field current loop and then biasing the base of the
>transistor with a control voltage to bring the C-field current to the same
>value it was before inserting the transistor. The steering "voltage" from
>the GPS controller would also be applied to the base of this "current"
>regulator through an appropriate resistor network. I think Tom may have an
>even better idea. Let's wait and see.
>
>73 John W4SF
>

114. Re: [TACGPS:1645] W5OJM Article in QST

From: Eduardo Jacob <edu@kender.es>
Date: Mon, 22 Jun 1998 22:47:03 -0100
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980622224703.00840ba0@kender.es>
Rendered body type: text/plain

>Just got my July QST. I recommend that you all read Brooks Shera's
>(W5OJM) article starting on Page 37. It describes in some detail
>his GPS-based frequency standard.

Would it very unpopular to ask someone to scan this article and send it by email to me?. I am affiliated at ARRL but the magazine arrives with 2 months of delay (I have just received the may number with the Hamvention advertisments). I would like to have it now because it's much more interesting (and easy) to follow your messages about this article having read it.

Regards and hope not to start a flame about illegal copying of magazines...

Eduardo/EA2BAJ

115. can anyone help me !!!

From: "prabhakar subrahmanyam" <prabhs@hotmail.com>
Date: Mon, 22 Jun 1998 14:08:30 PDT
To: tacgps@tapr.org
Message-ID: <19980622210830.10592.qmail@hotmail.com>
Rendered body type: text/plain

hello
i am interested in HAM
i wanna get ny license and want to everything abt it.
i know that it's a very interesting hobby, so lemme know where i canget started.

i am staying in california- mountainview.

pls lemme know
(1) where shud i get my license from ?
(2) who shud i contact ?
(3) will i get a international frequency to communicate with my friends abroad ?

anxiously
prabhakar

_____
Get Your Private, Free Email at http://www.hotmail.com

116. can anyone help me !!!

From: "prabhakar subrahmanyam" <prabhs@hotmail.com>
Date: Mon, 22 Jun 1998 14:08:48 PDT
To: tacgps@tapr.org
Message-ID: <19980622210848.15661.qmail@hotmail.com>
Rendered body type: text/plain

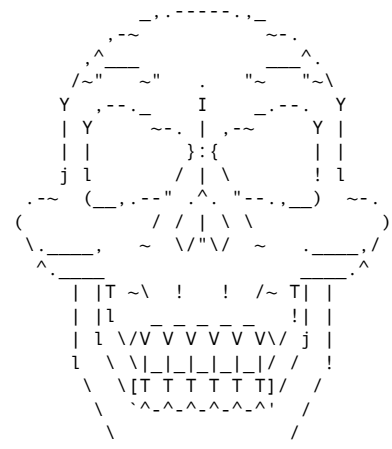
hello
i am interested in HAM
i wanna get ny license and want to everything abt it.
i know that it's a very interesting hobby, so lemme know where i canget
started.

i am staying in california- mountainview.

pls lemme know
(1) where shud i get my license from ?
(2) who shud i contact ?
(3) will i get a international frequency to communicate with my friends
abroad ?

anxiously
prabhakar

****
S. Prabhakar
509, Central Avenue,
Apartment 'S'
Mountainview
CA 94043
Tel : 650-969-9463 (res)
408-298-0800 extn 8223 (off)
prabhs@hotmail.com
rocketeer@goplay.com
http://www.angelfire.com/me/prabhs



_____
Get Your Private, Free Email at http://www.hotmail.com

117. Re: Rubidium Lifetimes

From: Mike Gingell <gingell@vnet.net>
Date: Mon, 22 Jun 1998 20:44:31 +0000 (WAT)
To: tacgps@tapr.org
Message-ID: <Pine.LNX.3.93.980622202405.157M-100000@hypersoft.vnet.net>
Rendered body type: text/plain

Dr Thomas A Clark (W3IWI)" <tac@clark.net> said

> So the only "lifetime killers" are the (replaceable) light bulb,
> and the fact that part of the innards must operate at an elevated
> temperature (which could "cook" some of the parts).

So what kind of light bulb is it? If incandescent then one might
expect a lifetime of 1-5 years if good, much less if not. Is it
an easily available part or something special? I have seen some
incadescents specified at 50000 hours and some like your average
domestic light bulb only 1000. Is there an alarm when (not if)
it fails?

You said it runs at an elevated temperature - is it in a
thermostatically controlled enviroment or is it just hot
because of the lamp and other devices.

Thanks very much for the other info on the way the basic device
works and the lifetime of the rubidium cell itself.

Regards
Dr. Mike Gingell, KN4BS Raleigh NC, USA   gingell@vnet.net
web site http://users.vnet.net/gingell/vnethome.html

118. Re: [TACGPS:1691] Re: Rubidium Lifetimes

From: Brian Chesire <BCChesire@worldnet.att.net>
Date: Mon, 22 Jun 1998 19:20:35 -0700
To: tacgps@tapr.org
Message-ID: <358F10F3.303D@worldnet.att.net>
Rendered body type: text/plain

The Lamp in my Rube is an RF excited rubidium vapor glow lamp. The
assembly consists of a gas cell, a heater to vaporize the Rb, and a
77Mhz oscillator-amplifier to excite it. The pump oscillator is
modulated at 127 Hz to provide an AC error signal to what is pretty much
a lock-in amplifier. This is the signal used to correct VCXO frequency.
        Given that the lamp consists of a quartz cell and some Rb, and nothing
else, the life should be unlimited. The controlling factor will be the
survival of the electronics. It appears that barring mechanical damage,
the physics package of Rubes is just about an infinite life item.

73's Brian
WA5PPO Tucson, AZ

119. Re: [TACGPS:1687] RE: Rb steering

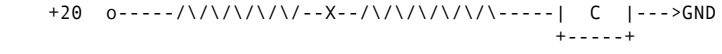
From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Tue, 23 Jun 1998 03:51:58 +0000
To: tacgps@tapr.org
Message-ID: <358F265E.BE85E970@clark.net>
Rendered body type: text/plain

Let me give you some hints on the Rb steering before I leave for
Europe tomorrow.

Don Haselwood is on the right track when he wrote:

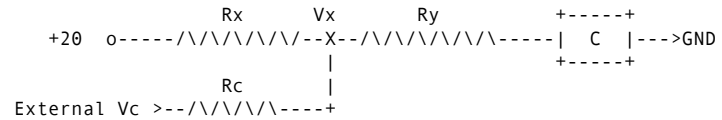
> Your are right! Pin 8 of TB1 does not go to +20, but goes to +20 thru R10
> (when R10 is in the remote freq adjust position). I was thinking along the
> lines of leaving R10 in-place so that the Rb trims normally, then tweaking
> the field magnet current from the controller via pin 9 and resistor.
>
> For control purposes the voltage v current issue is one semantics. (The Rb
> cell responds to the magnetic field, hence the current through winding is
> the key.) The current is set by +20v across the resistor network and coil
> resistance which produces the correct current for the field magnet. This
> current could be "trimmed" via a resistor connect to pin 9, and driven from
> a voltage. My guess is that the current variation needed is quite small
> (otherwise R25 would be much smaller, and R10 & R11 would not be selected).

Let's look at the equivalent circuit:



I'm using Rx & Ry because the FRK and M100 Rb's have different part
designators. The "C" box denotes the C-field coil wrapped around the
Rb cell. The Rx resistor is a network of several resistors, including
the trimming pot -- but it's still the equivalent of one resistor.

In my M-100, the voltage Vx at point X is ~1.8 volts. For the different
Rb's, the C-field bias resistor Ry is in the 350-400 ohm range, which
I'll take = 360 for this discussion. The resistance of the C-field coil
is < 1 ohm. By simple application of Ohm's law, the current flowing
thru the C-field coil and thru Rc is ~20 ma. And the equivalent resistance
of Rx is ~ 3600 ohms. Now lets look at a simple external control tweaker
with an external control voltage Vc injected thru a resistor Rc into X.
a



Regardless of the value you chose for Rc, if the external control voltage
is equal to the original Vx, then no current flows thru Rc and the C-field
current is unaffected. If you happened to use Rc = Ry, and set Vc=0 (at
gnd), then the C-field current is cut in half.

Now let me suggest some measurements that need to be made that will help
select an appropriate value for Rc by one of you who has a working Rb
and can measure frequency offsets accurately (this sounds like Brooks and
Don and, but perhaps there are others. And I'm not here to do anything
for the next ~month!).

1. Measure your current Vx that puts the Rb on frequency, and verify the
value of Ry.

2. Measure the peak range that the internal pot will control Vx. My guess
is that you will find it to be about +/- 20 or 25% of the correct Vx. Given
the value of Ry, this will probably correspond to C-field currents ranging
from about 15-25 ma.

3. While you are tweaking the frequency with the internal pot, measure the
Rb frequency error that results. My guess is that this will correspond to
frequency offsets (errors) in a range like +/- 1:10e10. Make sure to
identify the sign (like more current makes the frequency go higher).

4. Reset the internal pot to produce the correct Vx, and as a first try,
put Rc ~ 1 to 1.5 kohm (i.e. about 3-5 times Ry). Use a good stable film
resistor for Rc. I'll be you will find that a control voltage in the 0 to
+4 volt range range will pretty well match the entire Vx range you got
with the pot, i.e. a tuning range of around 1:10e10.

> I have some concern about introducing errors & noise. [snip]

I wouldn't be too concerned. If you follow my logic above, you will see
that a few mv of noise would correspond to ~1:10e13 frequency errors,
and the Rb won't be that stable!

Brooks Shera sent me a private note on the same topic saying

> I thought I would mention something that might be useful as you ponder
> how to provide EFC for the Efratoms. The DAC I used does have a current
> output capability (+/- 1 ma) in addition to the +/- 3 volt output (at 8
> ma max).
> In fact, the voltage output is generated by an internal op amp whose
> feedback resistor is fed by the current output. In this configuration
> the current output never develops a voltage very far from ground and
> the data sheet isn't any help in specifying what the limitations might be.
> However I could do a little experimenting. :-) It might save putting an
> external op amp between the controller and Rb.

I suspect that you will want to use the voltage output, but you might want
to see if there is a simple way to produce a DC bias offset about the same
as the nominal tuning voltage. Not knowing the DAC you used, my simple-
minded solution would be to use a good op amp (like an LF353) and add
a DC bias tweaker pot. By the simple-minded analysis above, the 8 ma
capability should be plenty to make it work.

For those of you who haven't looked at it, see Brook's web page at

    http://www.rt66.com/~shera

He has some more descriptive material than was in his QST article, and
discusses some of his Rube efforts.

73, Tom

120. Answering a few questions

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Tue, 23 Jun 1998 04:15:21 +0000
To: tacgps@tapr.org
Message-ID: <358F2BD9.EEBDD200@clark.net>
Rendered body type: text/plain

Eduardo Jacob (EA2BAJ) in Spain asked:
>   Would it very unpopular to ask someone to scan this article and send it by
> email to me?. I am affiliated at ARRL but the magazine arrives with 2
> months of delay (I have just received the may number with the Hamvention
> advertisments). I would like to have it now because it's much more
> interesting (and easy) to follow your messages about this article having
> read it.

Eduardo, you can get a lot of the material online from Brook's web site at

      http://www.rt66.com/~shera

Look there first, then if you have more questions, ask again!

Brooks -- could you add the schematic on your web page for people like Eduardo?

Mike Gingell (KN4BS) asked
> So what kind of light bulb is it? If incandescent then one might
> expect a lifetime of 1-5 years if good, much less if not. Is it
> an easily available part or something special? I have seen some
> incadescents specified at 50000 hours and some like your average
> domestic light bulb only 1000. Is there an alarm when (not if)
> it fails?

It is a special bulb. It is pretty trivial to change, with a special
threaded insert in the middle of the heat-sink on the older FRKs. You
have to open the box on the newer M-100's.

I'd guess that the lights are good for about 10 years of continuous
operation, but your mileage may vary.

If the bulb fails, there is plenty of indication. The 20-pin output
connector has two pins which are designed to drive indicator LEDs
which will show a fault if the bulb fails.

> You said it runs at an elevated temperature - is it in a
> thermostatically controlled enviroment or is it just hot
> because of the lamp and other devices.

The Rubidium cell is inside a special oven. The heater vaporizes the
material inside the "physics cell", so it must be hot to work. As a
result these standards run hot. They need to be hooked to a heat sink.
You can see a picture of the FRK with heat sink on Brooks' web site I
mentioned above (specifically at http://www.rt66.com/~shera/rb.JPG).
The used FRKs from Lehmann come with the necessary heat sink.

You can see my mounting of the newer M-100 on my ftp site at
ftp://aleph.gsfc.nasa.gov/GPS/toc/rubidium/ (specifically look at the GIF
pictures like ftp://aleph.gsfc.nasa.gov/GPS/toc/rubidium/rube_3.gif and
rube_1.gif and rube_2.gif). The heat sink I use is the heavy aluminum
L-bracket that mounts the M-100 plus an old junk heat sink I had that was
used to cool off four TO-3 power transistors. [The sony*.gif pictures show
my mods of the $10 Sony switcher supplies I use with the M-100. These
supplies serve as the mounting base for my assembly. The supplies were
discussed extensively here on TACGPS a couple of months ago].

73, Tom

121. Re: [TACGPS:1692] Re: Rubidium Lifetimes

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Tue, 23 Jun 1998 04:32:09 +0000
To: tacgps@tapr.org
Message-ID: <358F2FC9.B5A8C19E@clark.net>
Rendered body type: text/plain

Brian Chesire wrote:
> The Lamp in my Rube is an RF excited rubidium vapor glow lamp. The
> assembly consists of a gas cell, a heater to vaporize the Rb, and a
> 77Mhz oscillator-amplifier to excite it. [snip]

Brian -- you are right, and I was wrong! I somehow had a mindset that the
Rb cell was a passive absorption cell. I apologize for my brain-fade! Thanks
for playing "truth squad".

Let me quote from the M-100 book (which I should have re-read before I sent
the previous answer!):
" The physics portion consists of a resonator & a lamp. The lamp consists of
  a temperture controlled Rb lamp and an RF lamp exciter ... To maintain a
  well-define Rb vapor pressure in the lamp envelope, the lamp thermostat
  is set to approximately 115 deg C .... A ~1 watt RF field of approximately
  80 MHz is generated by the exciter. This field starts and maintains an
  electrodeless plasma discharge in the lamp envelope. The lamp light contains
  the desired (optical) spectral lines f Rb necessary for the optical pumping
  proccess."

73, Tom

122. Re: [TACGPS:1693] RE: Rb steering

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Tue, 23 Jun 1998 06:13:13 +0000
To: tacgps@tapr.org
Message-ID: <358F4779.BF8E9C74@clark.net>
Rendered body type: text/plain

Trying to get the comments out before I leave, I wrote this material
while I was away from my notes from memory. I see I made a couple of
minor errors, but they don't affect the conclusions/recommendations:

> Let's look at the equivalent circuit:
>
>   Rx   Vx   Ry   +-----+
>   +20 o-----/\/\/\/\/\/--X--/\/\/\/\/\/\-----| C |--->GND
>   +-----+
>
> I'm using Rx & Ry because the FRK and M100 Rb's have different part
> designators. The "C" box denotes the C-field coil wrapped around the
> Rb cell. The Rx resistor is a network of several resistors, including
> the trimming pot -- but it's still the equivalent of one resistor.
>
> In my M-100, the voltage Vx at point X is ~1.8 volts. For the different
> Rb's, the C-field bias resistor Ry is in the 350-400 ohm range, which
> I'll take = 360 for this discussion. The resistance of the C-field coil
> is < 1 ohm. By simple application of Ohm's law, the current flowing
> thru the C-field coil and thru Rc is ~20 ma. And the equivalent
> resistance of Rx is ~ 3600 ohms.

The correct value for Ry is ~270 ohms for both the FRK & M-100. Rx is
more like 3k.

I also see from my notes that the voltage across the C-field coil in
normal operation is ~0.1 to 0.2 volts, so that means that the resistance
of the C-field coil must be ~25 ohms, not the <1 ohm that I wrote earlier.

And I did the arithmetic wrong. Qith Ry=270 ohms and the C-field
coil ~ 25 ohms, the C-field coil current is more like 6 ma.

> [snip]
> 2. Measure the peak range that the internal pot will control Vx. My guess
> is that you will find it to be about +/- 20 or 25% of the correct Vx. Given
> the value of Ry, this will probably correspond to C-field currents ranging
> from about 15-25 ma.

Change that to a range like ~5-7 ma.

A good starting value for Rc would be 1k.

When you decide to permanently install Rc inside the black box,
I suggest you use two of the unused pins on the 20-pin power connector:

        S = GND
        N = External Control Input

The 20-pin connector has a wierd numbering sequence, and you may need
to use a magnifying glass to read the pin names:

          +-------------------------------+
          | x   v   S   N   k   F   c |
          | u   r   m   j   e   B |
          | w   t   P   L   H   d   a |
          +-------------------------------+

where the pins already used are in UPPER CASE:
        B = Rb lamp voltage monitor
        F = Xtal control voltage monitor
        H = Resonance lock monitor
        L = +26VDC power
        P = signal & power GND

Some of the Rb's use two pins on this connector for the 5/10 MHz RF
output & RF gnd, while others have an SMA RF connector.

       -

Sorry for the minor errors, but the methodology was OK. The past 3 weeks

have been real hell for me and my brain must be functioning at the 50%
level ;<{

For those who asked, the Europe trip is to LA and JW (that's Norway &
Spitzbergen for the non DXers). In JW, my destination is at 79 deg
north, 1200 km from the north pole at the world's most northerly
scientific base (and the most northerly bar) at Ny Alesund where
I am the "godfather" of a VLBI facility complete with 20M dish,
and my cryogenic receivers, Hydrogen Maser, 1 Gb/sec data system
(and yes, they have a TAC!).

73, Tom

123. Strange GPS positions....

From: Darryl Smith <vk2tds@ozemail.com.au>
Date: Tue, 23 Jun 1998 17:55:48 +1000
To: tacgps@tapr.org
Message-ID: <358F5F83.2AFA34D6@ozemail.com.au>
Rendered body type: text/plain

Hi there. I think this is the place to ask this type of question. Here
in Sydney Australia we are finally running APRS on one car. Looking
during todays logs I found the following entried. These are to be read
noting that we are about 34S and 151E.

VK2MV>VK2WI*>APRS:$GPGGA,000156,3355.5270,S,15111.7292,E,1,05,1.6,78.3,M,19.7,M,

VK2MV>VK2WI*>APRS:$GPVTG,154.3,T,141.8,M,00.0,N,00.0,K*41
VK2MV>VK2WI*>APRS:$GPGGA,000957,3434.9424,S,15123.3031,E,1,02,2.3,98.5,M,18.3,M,

VK2MV>VK2WI*>APRS:$GPVTG,167.2,T,154.4,M,,N,,K*48
VK2MV>VK2WI*>APRS:$GPGGA,001101,3503.5668,S,15130.1842,E,1,03,2.3,99.9,M,16.9,M,

VK2MV>VK2WI*>APRS:$GPVTG,169.2,T,156.2,M,,N,,K*42
VK2MV>VK2WI*>APRS:$GPVTG,170.3,T,157.1,M,,N,,K*49
VK2MV>VK2WI*>APRS:$GPGGA,001304,3600.7326,S,15141.6360,E,1,03,2.5,102.8,M,13.9,M

VK2MV>VK2WI*>APRS:$GPVTG,172.0,T,158.5,M,,N,,K*43
VK2MV>VK2WI*>APRS:$GPGGA,001356,3627.7673,S,15146.0815,E,1,02,2.5,105.1,M,11.6,M

VK2MV>VK2WI*>APRS:$GPVTG,173.0,T,159.4,M,,N,,K*42
VK2MV>VK2WI*>APRS:$GPGGA,001456,3700.6375,S,15150.5858,E,1,02,2.6,106.9,M,9.8,M,

VK2MV>VK2WI*>APRS:$GPVTG,174.3,T,160.5,M,,N,,K*4D
VK2MV>VK2WI*>APRS:$GPVTG,175.8,T,161.6,M,,N,,K*45
VK2MV>VK2WI*>APRS:$GPGGA,001706,3824.8989,S,15158.6419,E,1,03,2.8,111.1,M,5.6,M,

VK2MV>VK2WI*>APRS:$GPVTG,176.9,T,162.5,M,,N,,K*47

As you can see the station moved one degree in two minutes. This is a
bit fast for the rust bucket of a car. The GPS is a TAPR GPS-30PC,
mounted close to the 2M antenae. And the weather was a but wet, cold and
overcast (13 celcius).

I know about selective availability, but it should not operate be in teh
vacinity of 80 miles in two minutes.

My question - Is this the Garmin or the whole GPS positioning system?

Darryl VK2TDS

124. Re: [TACGPS:1697] Strange GPS positions....

From: "Doug McKinney" <buoy@redshift.com>
Date: Tue, 23 Jun 1998 05:24:03 -0700
To: <tacgps@tapr.org>
Message-ID: <004b01bd9ea3$b3d3c520$7ac6cccf@buoy.mcktech.com>
Rendered body type: text/plain

-----Original Message-----
From: Darryl Smith <vk2tds@ozemail.com.au>
To: tacgps@tapr.org <tacgps@tapr.org>
Date: Tuesday, June 23, 1998 1:14 AM
Subject: [TACGPS:1697] Strange GPS positions....

>Hi there. I think this is the place to ask this type of question. Here
>in Sydney Australia we are finally running APRS on one car. Looking
>during todays logs I found the following entried. These are to be read
>noting that we are about 34S and 151E.

>
>VK2MV>VK2WI*>APRS:$GPGGA,000156,3355.5270,S,15111.7292,E,1,05,1.6,78.3,M,19
.7,M,
>
>VK2MV>VK2WI*>APRS:$GPVTG,154.3,T,141.8,M,00.0,N,00.0,K*41
>VK2MV>VK2WI*>APRS:$GPGGA,000957,3434.9424,S,15123.3031,E,1,02,2.3,98.5,M,18
.3,M,
>
>VK2MV>VK2WI*>APRS:$GPVTG,167.2,T,154.4,M,,N,,K*48
>VK2MV>VK2WI*>APRS:$GPGGA,001101,3503.5668,S,15130.1842,E,1,03,2.3,99.9,M,16
.9,M,
>
>VK2MV>VK2WI*>APRS:$GPVTG,169.2,T,156.2,M,,N,,K*42
>VK2MV>VK2WI*>APRS:$GPVTG,170.3,T,157.1,M,,N,,K*49
>VK2MV>VK2WI*>APRS:$GPGGA,001304,3600.7326,S,15141.6360,E,1,03,2.5,102.8,M,1
3.9,M
>
>VK2MV>VK2WI*>APRS:$GPVTG,172.0,T,158.5,M,,N,,K*43
>VK2MV>VK2WI*>APRS:$GPGGA,001356,3627.7673,S,15146.0815,E,1,02,2.5,105.1,M,1
1.6,M
>
>VK2MV>VK2WI*>APRS:$GPVTG,173.0,T,159.4,M,,N,,K*42
>VK2MV>VK2WI*>APRS:$GPGGA,001456,3700.6375,S,15150.5858,E,1,02,2.6,106.9,M,9
.8,M,
>
>VK2MV>VK2WI*>APRS:$GPVTG,174.3,T,160.5,M,,N,,K*4D
>VK2MV>VK2WI*>APRS:$GPVTG,175.8,T,161.6,M,,N,,K*45
>VK2MV>VK2WI*>APRS:$GPGGA,001706,3824.8989,S,15158.6419,E,1,03,2.8,111.1,M,5
.6,M,
>
>VK2MV>VK2WI*>APRS:$GPVTG,176.9,T,162.5,M,,N,,K*47
>
>As you can see the station moved one degree in two minutes. This is a
>bit fast for the rust bucket of a car. The GPS is a TAPR GPS-30PC,
>mounted close to the 2M antenae. And the weather was a but wet, cold and
>overcast (13 celcius).
>
>I know about selective availability, but it should not operate be in teh
>vacinity of 80 miles in two minutes.
>
>My question - Is this the Garmin or the whole GPS positioning system?
>
>Darryl VK2TDS
>
>
In your GGA sentence the 7th position is the number of Sats in use. To have
an accurate (100m radius solution) requires 4 Sats. You have one with 5
Sats, 3 with 3 Sats and 3 with 2 Sats, so your GPS can't provide the
accurate solution on so few Sats.
73's
Doug

125. test

From: Dr Samuel Guccione <sguccion@outland.dtcc.edu>
Date: Tue, 23 Jun 1998 15:21:40 -0400 (EDT)
To: tacgps@tapr.org
Message-ID: <Pine.SV4.3.95.980623152122.18115A-100000@outland.dtcc.edu>
Rendered body type: text/plain

please delete

126. Re: [TACGPS:1692] Re: Rubidium Lifetimes

From: "James L. Johnson" <jjjohnson@saiph.hpl.hp.com>
Date: Tue, 23 Jun 1998 13:40:04 -0800 (PDT)
To: tacgps@tapr.org
Message-ID: <199806232040.NAA01937@saiph.hpl.hp.com>
Rendered body type: text/plain

>
> The Lamp in my Rube is an RF excited rubidium vapor glow lamp. The
> assembly consists of a gas cell, a heater to vaporize the Rb, and a
> 77Mhz oscillator-amplifier to excite it. The pump oscillator is
> modulated at 127 Hz to provide an AC error signal to what is pretty much
> a lock-in amplifier. This is the signal used to correct VCXO frequency.
>   Given that the lamp consists of a quartz cell and some Rb, and nothing
> else, the life should be unlimited. The controlling factor will be the
> survival of the electronics. It appears that barring mechanical damage,
> the physics package of Rubes is just about an infinite life item.
>

> 73's Brian
> WA5PPO Tucson, AZ
>
>

Well, unfortunately, the lifetime of Rb physics packages isn't quite
that long. The main failure item is the lamp, which suffers from the
Rb diffusing into the walls of the glass. Along with the Rb87, is a
buffer gas, krypton, giving it subtle properties (lamp starting,
collision broadening, etc.) that make the whole thing work. The
absorption cell also has the property that it will suffer a frequency
shift due to helium diffusing into the glass over time. Not
catastrophic, but a source of error.

73,

Jim W6SC
jjohnson@hpl.hp.com

127. Re: [TACGPS:1700] Re: Rubidium Lifetimes

From: Brian Chesire <BCChesire@worldnet.att.net>
Date: Tue, 23 Jun 1998 20:20:15 -0700
To: tacgps@tapr.org
Message-ID: <3590706F.40F9@worldnet.att.net>
Rendered body type: text/plain

Thanks for the info Jim. I stand corrected. After losing a couple dozen
HeNe laser tubes to helium loss, I should've realized that other failure
mechanisms exist. If helium can diffuse out it sure can get in. Used to
rejuvenate the laser tubes that way, get another years use out of them.
Learn something new every day. Do you know of a ref. that covers this or
is this from the school of hard knocks?
Thanks and 73's
Brian WA5PPO
Tucson, AZ

128. Re: [TACGPS:1701] Re: Rubidium Lifetimes

From: "James L. Johnson" <jjjohnson@saiph.hpl.hp.com>
Date: Wed, 24 Jun 1998 09:47:49 -0800 (PDT)
To: tacgps@tapr.org
Message-ID: <199806241647.JAA17377@saiph.hpl.hp.com>
Rendered body type: text/plain

>
> Thanks for the info Jim. I stand corrected. After losing a couple dozen
> HeNe laser tubes to helium loss, I should've realized that other failure
> mechanisms exist. If helium can diffuse out it sure can get in. Used to
> rejuvenate the laser tubes that way, get another years use out of them.
> Learn something new every day. Do you know of a ref. that covers this or
> is this from the school of hard knocks?
> Thanks and 73's
> Brian WA5PPO
> Tucson, AZ
>
>

Hi Brian,

  I've learned a lot from the reflector, especially about GPS. In the
case of the Rb standards, I wish I could sit here and tell you that it's
my years of hard work and experience as an expert in the field of
frequency standards. But, alas, I must confess it's the conversations I
have with the atomic physicist in the next cubicle that increase my
knowledge of the subject (!). However, there are many papers out there,
many published in the proceedings of a conference known as the IEEE
Frequency Control Symposium. When they meet each year, they have a
tutorial session on many aspects of frequency control, time transfer,
GPS, standards, oscillators, etc. and that is where a lot of good
quality information is disseminated. Manufacturer's catalogs, such as
the Efratom division of Ball, and Austron (Datum) provide valuable
information also. Another conference is the PTTI (Precision Time and
Time Interval) that also has their proceedings published, along with
tutorials. NIST and USNO publish a lot of information on this topic as
well. I believe both have web sites. Even HP has an app note on time,
timekeeping, time transfer, etc., titled "The Science of Timekeeping",
Application Note 1289.

  Hope this answers your question.

73,

Jim W6SC

129. Re: [TACGPS:1696] RE: Rb steering

From: Brooks Shera <ebs@lanl.gov>
Date: Sun, 28 Jun 98 14:05:49 -0600
To: <tacgps@tapr.org>
Message-ID: <199806282004.OAA13159@newreg.lanl.gov>
Rendered body type: text/plain

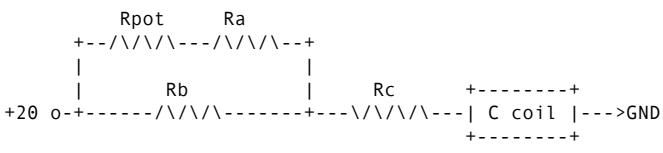
Some discussion occurred recently about the resistor values in the freq.
control network of the surplus Efratom FRK-L Rb standard that is (was?)
available from Doug Lehman.

I have had a unit for a few weeks and it has been running nicely with
only an occasional manual tweaking of its freq. pot to keep it in tune
with gps.

I finally screwed up my courage and unscrewed the screws that hold the
cover on. After you break all the nice seals that Doug
put on after his calibration, the cover pops right off.

Unfortunately, the circuitry inside doesn't correspond very closely to
the manual I got from Doug. Moreover, tracing the circuit is difficult
because the boards are multi-layer and the backside of the relevant board
is not accessible without unsoldering a number of wires, which I was
reluctant to do. Also, the resistors are labeled with a 6 band color
code that I'm not too sure I understand.

But by probing around with an ohmmeter and a voltmeter I have concluded
the circuit is this:



The resistor values are
Rpot = 1K (20 turn), set at about 500 ohms
Ra = (orange red yellow brn brn red), probably 3240 ohms
Rb = (blue yellow brn brn brn brn), probably 6410 ohms
Rc = (hidden somewhere out of sight), probably about 270 ohms
C coil = about 29 ohms
Note that Ra, Rb will probably be different in other units.

The voltages:
at the Ra,b,c junction 2.226 volts, across the C coil 0.233 volts, and
the coil current is about 7.5 ma (when the Rb is on freq.)

Tuning sensitivity:
The 20-turn tuning pot (Rpot) is accessible via a small hole thru the
bottom of the heat sink. Doug covered it with a seal. In my unit the pot
was almost exactly in the center of its range when the Rb is on freq.
Turning the pot 5 turns CLOCKWISE INCREASED the freq. by about 7.5 parts
in 10E10, and voltage at the Ra,b,c junction increased from 2.226 to
2.327 volts. Turning the pot 5 turn CCW produced approximately the
reverse effect.
The tuning sensitivity is then, +7.5x10E-9/volt at the Ra,b,c junction,
or +2.2x10E-9/ma thru the C coil.

Modifications for locking to GPS
The DAC in my gps controller board (see QST, July '98 or
www.rt66.com/~shera) can operate in either a voltage (+/- 3v) or a
current mode (+/- 1ma), however the PCB distributed by A&A is wired to
use it in a voltage mode. A voltage source can be used as current source
if it drives a low impedance through a relatively larger series
impedance. With this in mind, and to conveniently match the FRK-L to the
sensitivity presently programmed into the digital PLL in the controller,
I have chosen to control the C-coil current by attaching a resistor at
the Rc - C coil junction. The DAC is connected directly to the other end
of this resistor. The value needed for the resistor turns out be 250 ohms
(I used a 270). I wired the resistor inside the unit so if I
accidentally applied a large voltage, like +5v, to the C-coil connector
pin I wouldn't burnout the C coil.

Making the connection

Take off the cover, turn the FRK-L upside down with the heat sink on your
left. The 20 turn pot is on your left, Ra and Rb are to the right of an
electrolytic cap which is next to the pot. One of the resistors is
labelled R24 on the PCB stencil, and the traces connecting the resistors
to the pot are visible. The C coil wires are connected to the terminals
numbered 6 and 7 near the multipin power connector. Terminal 6 is the
top end of the C coil, terminal 7 is the gnd end. The new 270 ohm
resistor connects between terminal 6 and any convenient unused connector
pin.

Does it work?
Yes. I've been running the Rb locked to GPS for a couple of days with
my controller set to the longest time constant available (about 13
hours). So far, it looks fine. After a few days of data have accumulated
and I can begin to see the drift rate, etc., I'll post a graph on my web
page (like the Austron quartz osc. graph that is there now). If it
appears that an even longer time constant would be useful I can make a
version of the PIC software especially for Rb oscillators. (Trade-ins on
preprogrammed standard PICs cheerfully accepted at a nominal cost.)

73, Brooks

BTW, many thanks for the nice words that have been posted recently about
my QST article. They mean alot to me.

130. Re: [TACGPS:1703] RE: Rb steering

From: mdmiller@onramp.net
Date: Mon, 29 Jun 1998 02:29:23 -0500
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980629022923.0081b410@199.1.11.3>
Rendered body type: text/plain

Brooks,
I was wondering how easy it would be to modify your source code for various
VCXO's? This would I hope make it unessessary to use the R5/R6 voltage
divider?
I have been gathering PIC reference material in hopes of learning how to
program these devices.
73
Mark Miller
N5RFX

At 03:06 PM 6/28/98 -0500, you wrote:
>I can make a version of the PIC software especially for Rb oscillators.
(Trade-ins on
preprogrammed standard PICs cheerfully accepted at a nominal cost.)

>73, Brooks

131. Re: [TACGPS:1704] RE: Rb steering

From: Brooks Shera <ebs@lanl.gov>
Date: Mon, 29 Jun 98 18:11:42 -0600
To: <tacgps@tapr.org>
Message-ID: <199806300010.SAA04398@newreg.lanl.gov>
Rendered body type: text/plain

Mark Miller wrote:

>I was wondering how easy it would be to modify your source code for various
>VCXO's? This would I hope make it unessessary to use the R5/R6 voltage
>divider?

This would be possible. The total gain around the phase-locked
loop has to have a certain value that depends upon the filter
time constant and maximum attenuation that are chosen for the design.

The total gain is a product several factors: the sensitivity of the
phase detector, the DAC, the VCXO, the "mathematical" gain
of the CPU program, and finally the resistor network (R5,6) attenuation.

Since I didn't know what VCXO a builder might use, I arrived at
the solution of letting him adjust the resistor network attenuation
up or down to compensate for more or less gain in the VCXO. Hence
the "magic" constant in the article: 7.5 x 10e-9/volt.

I could, of course, adjust the CPU gain to fit the VCXO. However,
this would usually require high-precision FLOATING POINT (FP)
calculations in the PIC (now I do 40-bit scaled integer arithmatic

by stacking together several of the 8-bit PIC memory locations).
Microchip has some FP routines that could be copied but as I recall
they aren't precise enough (only 16-bit operands).

Given the above, I feel that using a couple of resistors (actually
only 1 resistor in the case of the Efratom) is the easier
solution.

Special programming for a VERY long time constant to get the best
out of a good Rb oscillator would be worth while though, if it looks
warranted.

>I have been gathering PIC reference material in hopes of learning how to
>program these devices.

You might want to check out a new book "Programming and Customizing the
PIC Microcontroller," Myke Predko, McGraw-Hill 1998, which I noticed in a
bookstore recently. Athough I haven't looked at it carefully it appeared
to be quite helpful. Of course, the Microchip PIC16C73X Data Sheet
(actually a 300 page booklet) is invaluable. It's available from DigiKey
or your Microchip rep.

73, Brooks

132. Re: [TACGPS:1703] RE: Rb steering

From: Mary Beth Haselwood <k4jpj@appstate.campus.mci.net>
Date: Mon, 29 Jun 1998 20:42:41 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980629204241.00801660@appstate.campus.mci.net>
Rendered body type: text/plain

Brook,

>Some discussion occurred recently about the resistor values in the freq.
>control network of the surplus Efratom FRK-L Rb standard that is (was?)
>available from Doug Lehman.

Thanks for the info on the FRK-L. This is a big help.

73's
Don, W4DH

July 1998

Original source file: tacgps.9807
Source: http://ftp.tapr.org/product_docs/TAC2/mail_archives/tacgps.9807

1. Motorola Oncore Board problems

From: Dr Samuel Guccione <sguccion@outland.dtcc.edu>
Date: Wed, 1 Jul 1998 11:10:50 -0400 (EDT)
To: tacgps@tapr.org
Message-ID: <Pine.SV4.3.95.980701110346.219B-100000@outland.dtcc.edu>
Rendered body type: text/plain

Please forgive this somewhat off the subject message. I am trying to get a
Motorola Oncore board functioning. I am using the software supplied with
the board to communicate in binary. I power up the board using my bench
supply at 5 volts connected to pin 2 of the boards DIP connector. I read
a current of about 200 or so milliamps which seems to agree with the 1.1
watt spec of the Oncore.

A Motorola active antenna is connected to the board. I start up the
software and it begins the initilization after I answer the two initial
questions. The first init does not produce a response so it begins the
longer init. However, when it finishes with the longer init, I do not get
any response from the board.

This is a new Oncore board from TAPR. Anyone have this problem? Does
anyone know if the boards from TAPR malfunction and need to be replaced?
This is actually a replacement for another that I thought was bad.

Should I talk to Motorola about my problem?

Sam, K3BY

2. Re: [TACGPS:1707] Motorola Oncore Board problems

From: "Ronald G. Parsons" <w5rkn@amsat.org>
Date: Wed, 01 Jul 1998 10:55:56 -0500
To: tacgps@tapr.org
Message-ID: <359A5C0C.1BB7ADF8@amsat.org>
Rendered body type: text/plain

Besides the obvious of making sure the cabling is corrrect, do you get
any response from the Self Test F-key? Can you put a scope on the serial
lines and see if any data is going in or out of the Oncore?

Ron

Dr Samuel Guccione wrote:
>
> Please forgive this somewhat off the subject message. I am trying to get a
> Motorola Oncore board functioning. I am using the software supplied with
> the board to communicate in binary. I power up the board using my bench
> supply at 5 volts connected to pin 2 of the boards DIP connector. I read
> a current of about 200 or so milliamps which seems to agree with the 1.1
> watt spec of the Oncore.
>
> A Motorola active antenna is connected to the board. I start up the
> software and it begins the initilization after I answer the two initial
> questions. The first init does not produce a response so it begins the
> longer init. However, when it finishes with the longer init, I do not get
> any response from the board.
>
> This is a new Oncore board from TAPR. Anyone have this problem? Does
> anyone know if the boards from TAPR malfunction and need to be replaced?
> This is actually a replacement for another that I thought was bad.
>
> Should I talk to Motorola about my problem?
>
> Sam, K3BY

--
Ron Parsons
W5RKN

3. Re: [TACGPS:1707] Motorola Oncore Board problems

From: "Steven R. Bible" <srbible@gate.net>
Date: Wed, 01 Jul 1998 13:00:52 -0400
To: tacgps@tapr.org

Message-ID: <3.0.5.32.19980701130052.0079ccb0@pop.gate.net>
Rendered body type: text/plain

At 10:13 AM 7/1/98 -0500, you wrote:

[snip]
>This is a new Oncore board from TAPR. Anyone have this problem? Does
>anyone know if the boards from TAPR malfunction and need to be replaced?
>This is actually a replacement for another that I thought was bad.

Sam, try reseting the Oncore with the "default" command. I've had to do
this with my Oncores and after 15 minutes should be working.

Also try TAC32 to initialize the Oncore just as a second check.

>Should I talk to Motorola about my problem?

It is possible that the Oncore has failed. This does happen. If you
believe after your testing that the Oncore you recently received is bad,
call Dorothy at the TAPR Office for an RMA number and we'll gladdly replace
the unit.

4. (Fwd) State of the art timekeeping, [the promised summary]

From: john.ackermann@daytonOH.ncr.com (John Ackermann)
Date: Wed, 01 Jul 1998 19:51:52 GMT
To: tacgps@tapr.org
Message-ID: <199807011959.PAA28243@ranger.daytonoh.ncr.com>
Rendered body type: text/plain

Here's an interesting post from comp.protocols.ntp.

John

From: Poul-Henning Kamp <phk@freebsd.org>
Subject: State of the art timekeeping, [the promised summary]
Date: Wed, 01 Jul 1998 15:34:43 +0200
Organization: CyberCity Internet

I promised you guys a summary of my work-in-progress presentation at
USENIX in New Orleans. Now that I have recovered somewhat from the heat
they have down there I'll make good on that promise:

I have basically succeeded in making FreeBSD (and any other UNIX which
adopts the code in question) able to track any current and likely future
source of time signals down to whatever your hardware is capable of.

At the USENIX I showed a couple of graphs which proved this point: The
first one is from a paper Motorola has published on the performance of
their OnCore GPS receiver, in which they hold the GPS against a Cesium
for an hour. The second graph was my OnCore unit fed into ntpd and
plotting the clockstats file on the same scales. The two curves are for
all practical purposes identical, which means that my PC using a
Ovenized Xtal for time reference, disciplined with NTPD from the
GPS pulse per second signal approaches Cesium performance.

The exact setup is this: I have a "VCC Hot1" FPGA prototyping card, in
which I have implemented in VHDL a "timecounter" which FreeBSD uses for
timekeeping. (A "timecounter" is just a binary counter running from a
stable frequency.) This one runs at 90.112 MHz, derived from a $90
surplus OCXO. In the FPGA is also a latch which captures the counter
contents when the GPS PPS signal rises.

The code I added to FreeBSD keeps track of UTC in 32bit fractions of
nanoseconds, and thanks to a few changes here and there, NTPD can
exploit this precision fully. This is really the crucial bit: of all
the UNIX kernels I know, this is the only one which doesn't do
adjustments in 1 microsecond jumps, and consequently the only one which
can split the microsecond at this time.

The short explanation on this code is that it converts a delta in
counter reading to 32bit fractions of nanoseconds using fixed point
integer arithmetic, which allows for almost continuous frequency and
phase adjustment rather than N microsecond phase-steps every
hardclock(), it allows for hardware capturing of time events rather than
relying on interrupt based timestamping (which is hampered by half a
microsecond jitter or more), finally some changes to the
NTP kernel-PLL interface has allowed NTPD to steer the PLL more
precisely as well.

The current specs for the timecounter code is:
        * time resolution: 1E-9/2^32 = .232 attoseconds (.232E-18)
        * frequency adjustment: PPM/2^16 = .000015 PPM = 1.5E-11
        * phase adjustment: usec/2^12 = .224 nsec.

Needless to say, you can run it directly from the RF output (5, 10 or
any other number of MHz) from a primary or secondary frequency standard,
no need to take the detour around PPS signals first.

I have started knitting a paper about these timecounters, but the source
is really easy to understand sys/kern/kern_clock.c in FreeBSD -current
if you're interested.

The performance right now, determined visually from plots, is better
than +/- 50 nanosecond, but since Motorola says their receiver is doing
38nsec with stdev=1, then for all I know, it could be running at the
hardware teoretical limit of (+/-1)/90.112MHz. I have only had this
running for about a week, so I have not even started doing serious math
on the data yet.

I will be back ticking away at this after my summer vacation, and I hope
to have the paper about all of this ready during the autumn sometime and
if I can find a sponsor for my travel, I'll present it as some suitable
conference.

I have a web-page for this little project:
http://phk.freebsd.dk/rover.html which will be updated as I have
time&news to share. All sourcecode & scematics are available for free
to people who are serious about timekeeping. (Sorry: if you're not
going to build this now you'll have to wait for the paper).

Many thanks to Dave Mills for invaluable insight and help on the way,
(I promise to get that LORAN-C wired up as the next thing!)

Poul-Henning

PS: sponsor sought for surplus cesium standard!

PPS: If you have a UT oncore with software version 1.3 or lower, you
need to get an upgrade to remove some software-bug induced jitter from
the PPS signal before you will get below ~70nsec. This probably also
applies for the VP oncore, but I don't know for what software versions.

5. Re: [TACGPS:1710] (Fwd) State of the art timekeeping, [the promised summary]

From: "James L. Johnson" <jjjohnson@saiph.hpl.hp.com>
Date: Wed, 1 Jul 1998 13:43:42 -0800 (PDT)
To: tacgps@tapr.org
Message-ID: <199807012043.NAA03766@saiph.hpl.hp.com>
Rendered body type: text/plain

Robin,

   There is some Greek in here (gobbledygook?) but there
may be something interesting if you can decypher it.

Jim

>
> Here's an interesting post from comp.protocols.ntp.
>
> John
>
> ----------------
> From: Poul-Henning Kamp <phk@freebsd.org>
> Subject: State of the art timekeeping, [the promised summary]
> Date: Wed, 01 Jul 1998 15:34:43 +0200
> Organization: CyberCity Internet
>
> I promised you guys a summary of my work-in-progress presentation at
> USENIX in New Orleans. Now that I have recovered somewhat from the heat
> they have down there I'll make good on that promise:
>
> I have basically succeeded in making FreeBSD (and any other UNIX which
> adopts the code in question) able to track any current and likely future
> source of time signals down to whatever your hardware is capable of.
>
> At the USENIX I showed a couple of graphs which proved this point: The
> first one is from a paper Motorola has published on the performance of

> their OnCore GPS receiver, in which they hold the GPS against a Cesium
> for an hour. The second graph was my OnCore unit fed into ntpd and
> plotting the clockstats file on the same scales. The two curves are for
> all practical purposes identical, which means that my PC using a
> Ovenized Xtal for time reference, disciplined with NTPD from the
> GPS pulse per second signal approaches Cesium performance.
>
> The exact setup is this: I have a "VCC Hot1" FPGA prototyping card, in
> which I have implemented in VHDL a "timecounter" which FreeBSD uses for
> timekeeping. (A "timecounter" is just a binary counter running from a
> stable frequency.) This one runs at 90.112 MHz, derived from a $90
> surplus OCXO. In the FPGA is also a latch which captures the counter
> contents when the GPS PPS signal rises.
>
> The code I added to FreeBSD keeps track of UTC in 32bit fractions of
> nanoseconds, and thanks to a few changes here and there, NTPD can
> exploit this precision fully. This is really the crucial bit: of all
> the UNIX kernels I know, this is the only one which doesn't do
> adjustments in 1 microsecond jumps, and consequently the only one which
> can split the microsecond at this time.
>
> The short explanation on this code is that it converts a delta in
> counter reading to 32bit fractions of nanoseconds using fixed point
> integer arithmetic, which allows for almost continuous frequency and
> phase adjustment rather than N microsecond phase-steps every
> hardclock(), it allows for hardware capturing of time events rather than
> relying on interrupt based timestamping (which is hampered by half a
> microsecond jitter or more), finally some changes to the
> NTP kernel-PLL interface has allowed NTPD to steer the PLL more
> precisely as well.
>
> The current specs for the timecounter code is:
>   * time resolution: 1E-9/2^32 = .232 attoseconds (.232E-18)
>   * frequency adjustment: PPM/2^16 = .000015 PPM = 1.5E-11
>   * phase adjustment: usec/2^12 = .224 nsec.
>
> Needless to say, you can run it directly from the RF output (5, 10 or
> any other number of MHz) from a primary or secondary frequency standard,
> no need to take the detour around PPS signals first.
>
> I have started knitting a paper about these timecounters, but the source
> is really easy to understand sys/kern/kern_clock.c in FreeBSD -current
> if you're interested.
>
> The performance right now, determined visually from plots, is better
> than +/- 50 nanosecond, but since Motorola says their receiver is doing
> 38nsec with stdev=1, then for all I know, it could be running at the
> hardware teoretical limit of (+/-1)/90.112MHz. I have only had this
> running for about a week, so I have not even started doing serious math
> on the data yet.
>
> I will be back ticking away at this after my summer vacation, and I hope
> to have the paper about all of this ready during the autumn sometime and
> if I can find a sponsor for my travel, I'll present it as some suitable
> conference.
>
> I have a web-page for this little project:
> http://phk.freebsd.dk/rover.html which will be updated as I have
> time&news to share. All sourcecode & scematics are available for free
> to people who are serious about timekeeping. (Sorry: if you're not
> going to build this now you'll have to wait for the paper).
>
> Many thanks to Dave Mills for invaluable insight and help on the way,
> (I promise to get that LORAN-C wired up as the next thing!)
>
> Poul-Henning
>
> PS: sponsor sought for surplus cesium standard!
>
> PPS: If you have a UT oncore with software version 1.3 or lower, you
> need to get an upgrade to remove some software-bug induced jitter from
> the PPS signal before you will get below ~70nsec. This probably also
> applies for the VP oncore, but I don't know for what software versions.
>
>

6. HP-107BR

From: Lester.Veenstra@comsat.com
Date: Wed, 1 Jul 1998 17:15:14 -0400
To: tacgps@tapr.org
Message-ID: <0008CE4A.3332@comsat.com>
Rendered body type: text/plain

I have a very well aged (+30 years old out of one of
the original INTELSAT network earth stations) working
crystal freq standard, an HP-107BR. On the back, along
with the outputs is a BNC marked "Electrical Freq
Control". Looks like a prime candidate for a little
frequency disciplining using GPS/TAC.

However, I have no manual: Does anyone have any idea
what the control interface might be?

Tnx
Les
K1YCM

7. Re: [TACGPS:1707] Motorola Oncore Board problems

From: "Doug McKinney" <buoy@redshift.com>
Date: Wed, 1 Jul 1998 22:17:59 -0700
To: <tacgps@tapr.org>
Message-ID: <001601bda578$ca07a880$bac6cccf@buoy.mcktech.com>
Rendered body type: text/plain

-----Original Message-----
From: Dr Samuel Guccione <sguccion@outland.dtcc.edu>
To: tacgps@tapr.org <tacgps@tapr.org>
Date: Thursday, July 02, 1998 8:21 AM
Subject: [TACGPS:1707] Motorola Oncore Board problems

>Please forgive this somewhat off the subject message. I am trying to get a
>Motorola Oncore board functioning. I am using the software supplied with
>the board to communicate in binary. I power up the board using my bench
>supply at 5 volts connected to pin 2 of the boards DIP connector. I read
>a current of about 200 or so milliamps which seems to agree with the 1.1
>watt spec of the Oncore.
>
>A Motorola active antenna is connected to the board. I start up the
>software and it begins the initilization after I answer the two initial
>questions. The first init does not produce a response so it begins the
>longer init. However, when it finishes with the longer init, I do not get
>any response from the board.

Motorola may ship the VP ONCOREs in any mode. What you are describing is
the non-navigating mode called IDLE. The other mode is FIX, which is the
Position Fix mode. In addition, the data update rate may also be set to
zero. With PC Controller software (which you indicated you have by your
startup sequence comment), you can type fix, which will get you in the
postion navagation mode and the type ps8 1, which will get you into the
1 postion reporting every 1 second (or ps8 5 for every 5 second update).
This should solve your problems. Motorola has had an outstanding
performance record and I asked a Rep if he has had any failures and he said
no. Therefore, I suspect the startup sequence procedure!
73's
Doug

>
>This is a new Oncore board from TAPR. Anyone have this problem? Does
>anyone know if the boards from TAPR malfunction and need to be replaced?
>This is actually a replacement for another that I thought was bad.
>
>Should I talk to Motorola about my problem?
>
>Sam, K3BY
>

8. Re: [TACGPS:1707] Motorola Oncore Board problems

From: "Doug McKinney" <buoy@redshift.com>
Date: Thu, 2 Jul 1998 07:22:19 -0700
To: <tacgps@tapr.org>
Message-ID: <001001bda5c4$d49eec80$c1c6cccf@buoy.mcktech.com>
Rendered body type: text/plain

-----Original Message-----
From: Dr Samuel Guccione <sguccion@outland.dtcc.edu>

To: tacgps@tapr.org <tacgps@tapr.org>
Date: Thursday, July 02, 1998 8:21 AM
Subject: [TACGPS:1707] Motorola Oncore Board problems

>Please forgive this somewhat off the subject message. I am trying to get a
>Motorola Oncore board functioning. I am using the software supplied with
>the board to communicate in binary. I power up the board using my bench
>supply at 5 volts connected to pin 2 of the boards DIP connector. I read
>a current of about 200 or so milliamps which seems to agree with the 1.1
>watt spec of the Oncore.
>
>A Motorola active antenna is connected to the board. I start up the
>software and it begins the initilization after I answer the two initial
>questions. The first init does not produce a response so it begins the
>longer init. However, when it finishes with the longer init, I do not get
>any response from the board.

My inital comments on the Idle/Fix mode assumed you have the VP ONCORE
sending RS232 to the PC with ONCORE pins 8 (TTL TXD), 9 (TTL RXD) and 10
 GND) TTL siganls going into a MAX232 chip and the RS232 levels are going to
DB9-2 (TXD), DB9-3 (RXD) and DB9-5 (GND). This assumes you know the 10 pin
numbering sequence. If you are having these kind of problems, you may want
to order a VP Interface Board from TAPR. The board accepts 7-30vdc and
provides 5vdc with 250ma and has an onboard MAX232.
73's
Doug

>
>This is a new Oncore board from TAPR. Anyone have this problem? Does
>anyone know if the boards from TAPR malfunction and need to be replaced?
>This is actually a replacement for another that I thought was bad.
>
>Should I talk to Motorola about my problem?
>
>Sam, K3BY
>

9. Receiver/Comparitor

From: "James R. Johns" <jrjohns@mitre.org>
Date: Thu, 02 Jul 1998 12:36:36 -0400
To: tacgps@tapr.org
Message-ID: <3.0.3.32.19980702123636.0349a7fc@mail91.mitre.org>
Rendered body type: text/plain

This is somewhat off topic from GPS but is related to tracking a local
frequency standard to a traceable reference.

I've just acquired a Tracor 599K VLF (WWVB) receiver/comparitor without a
manual and was looking for someone who might walk me through the controls
and input/outputs via Email. I've Emailed inquiries to several test
equipment manual suppliers with no luck to date locating a manual.

Any suggestions or recommendations appreciated. Thanks.

Jim Johns KA0IQT
jrjohns@mitre.org

10. Re: [TACGPS:1715] Receiver/Comparitor

From: Jeffrey Pawlan <jpawlan@pawlan.com>
Date: Thu, 2 Jul 1998 15:35:36 -0700 (PDT)
To: tacgps@tapr.org
Message-ID: <Pine.SOL.3.96.980702153118.553B-100000@jpawlan>
Rendered body type: text/plain

Dear Jim,

  I just sold a working one of these with manual to
Philip Gabriel, AA0BR in Ft. Collins Colorado. He is only 7 miles
from the transmitter so he obviously has no diurnal variation. I, on
the other hand could not get any precision here in Calif so I had
switched to Loran-C 2 years ago.

You can reach Philip by phone at his home: 970 490-1865, from 6:30pm
MDT to 10pm MDT. He always has his answering machine on so tell him
your callsign and if he is home he will pick up.

73s,
Jeffrey Pawlan, WA6KBL

11. Re: [TACGPS:1712] HP-107BR

From: Jeffrey Pawlan <jpawlan@pawlan.com>
Date: Thu, 2 Jul 1998 15:40:54 -0700 (PDT)
To: tacgps@tapr.org
Message-ID: <Pine.SOL.3.96.980702153613.553C-100000@jpawlan>
Rendered body type: text/plain

Dear Les,

I have 3 of these and have the original manual. The connector on the back should normally have a shorting plug or an adapter with a shorting wire in place. If you want to use this as EFC, make absolutely certain that you do not exceed +/- 5 volts max. This should give you +/- 2 parts in 10E-8 frequency change.

73s,
Jeffrey Pawlan, WA6KBL

12. Re[2]: [TACGPS:1712] HP-107BR

From: Lester.Veenstra@comsat.com
Date: Mon, 6 Jul 1998 10:31:04 -0400
To: Mastenbrook Gary-G13216 <g13216@email1.wes.mot.com>
Cc: tacgps@tapr.org
Message-ID: <0008DEC7.3332@comsat.com>
Rendered body type: text/plain

Gary:
Yes I got the following reply from WA6KBL, so it looks like I have what I need for immediate requirements. Next step will be to zero another source against the HP-107BR and see if the EFC function works as described. Subsequent to sending the first message, it occurred to me to do the obvious and ask HP if they had manuals available. Turns out they did have a fiche available, so I ordered that

Les

Subject: [TACGPS:1717] Re: HP-107BR
Author: tacgps@tapr.org at INTERNET Date: 7/2/98 5:43 PM

Dear Les,

I have 3 of these and have the original manual. The connector on the back should normally have a shorting plug or an adapter with a shorting wire in place. If you want to use this as EFC, make absolutely certain that you do not exceed +/- 5 volts max. This should give you +/- 2 parts in 10E-8 frequency change.

73s,
Jeffrey Pawlan, WA6KBL

_____ Reply Separator _____
Subject: RE: [TACGPS:1712] HP-107BR
Author: Mastenbrook Gary-G13216 <g13216@email1.wes.mot.com> at INTERNET
Date: 7/6/98 8:38 AM

Les- I wonder if you found your I/O information yet? I believe I may have the same unit at home (and should be able to find out for sure later today)... If so, I should have a manual in the bookcase and would be able to provide a copy for you. I've had mine working with a loran timing receiver and was successful in getting it locked to that standard. I plan on getting it locked up to GPS in the near future with a purchased/homebrew controller system of one form or another.
Regards,
Gary Mastenbrook, N8DMT
Chicago, IL

> -----Original Message-----
> From: Lester.Veenstra@comsat.com [SMTP:Lester.Veenstra@comsat.com]
> Sent: Wednesday, July 01, 1998 4:17 PM
> To: tacgps@tapr.org
> Subject: [TACGPS:1712] HP-107BR
>
> I have a very well aged (+30 years old out of one of

>   the original INTELSAT network earth stations) working
>   crystal freq standard, an HP-107BR. On the back, along
>   with the outputs is a BNC marked "Electrical Freq
>   Control". Looks like a prime candidate for a little
>   frequency disciplining using GPS/TAC.
>
>   However, I have no manual: Does anyone have any idea
>   what the control interface might be?
>
>   Tnx
>   Les
>   K1YCM
[Attachment: RFC822 message headers; text/plain; 1,310 bytes]

13. Re: [TACGPS:1573] 1998 ARRL and TAPR Digital Communications Conference

From: mdmiller@eaze.net
Date: Mon, 06 Jul 1998 22:10:14 -0500
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980706221014.007f5330@mail.eaze.net>
Rendered body type: text/plain

Greg,

I attended the DCC last year in Baltimore, and what made it interesting for
me was the GPS and Spread Spectrum seminars. Looking through the schedule
I don't see any of these subjects listed this year (except for APRS GPS).

Will there by any seminars on GPS disciplining of oscillators?

What type of Spread Spectrum information can I expect?

73
Mark Miller
N5RFX

At 02:48 PM 5/31/98 -0500, you wrote:

>Topics will include APRS, satellite communications, TCP/IP, digital radio,
>Spread Spectrum, and many others. Come to the conference and hear these
>topics presented by the experts! Don't miss this opportunity to listen and
>talk to others in these areas.
>
>-----

>What can you expect during the 1998 ARRL and TAPR Digital Communications
>Conference?
>
>*   SIGs (Special Interest Groups) get-togethers on Saturday, following
>   the banquet
>
>If you have attended a Digital Communications Conference in the past,
>remember how much fun it was discussing the latest developments into the
>wee hours! If you have never been to a Digital Communications Conference,
>then make your plans now to attend and find out how much fun they can be.

14. Re: [TACGPS:1719] Re: 1998 ARRL and TAPR Digital Communications

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Tue, 7 Jul 1998 10:34:38 -0500
To: tacgps@tapr.org
Message-ID: <v04003a14b1c7efe93b4a@[207.8.125.50]>
Rendered body type: text/plain

>Greg,
>
>I attended the DCC last year in Baltimore, and what made it interesting for
>me was the GPS and Spread Spectrum seminars. Looking through the schedule
>I don't see any of these subjects listed this year (except for APRS GPS).
>
>Will there by any seminars on GPS disciplining of oscillators?
>
>What type of Spread Spectrum information can I expect?
>
>73
>Mark Miller
>N5RFX
>

Well, every year is different. I think if you enjoyed the SS talks last
year on Sunday you will again like the seminar we have put together for

Sunday. Both Lyle's and Tim's talks will be very good and Tim's very
relevant to generating networks using Spread Spectrum techniques.

As to GPS disciplining of oscillators, that will depend if someone submits
a paper or not for the main session ? Hopefully, Tom Clark or someone else
working in this area will be presenting something -- but we have little
control from year to year on what people do present in the paper session.
I am sure it will probably come up in some form during the intro sesions on
GPS most likey.

As always, if the area you are interested in is not actually being formally
presented, you have the chance to meet in person with the people that know
it, since they will be there. Just a matter of coming and saying hello to
them and asking a question.

Hope to see you in Chicago. http://www.tapr.org/dcc

Don't forget that the paper deadline is Aug 15th!

Cheers - Greg

Greg Jones, WD5IVD   Austin, Texas
wd5ivd@tapr.org   http://www.tapr.org/~wd5ivd

Real World, The n.:
        5. Anywhere outside a university. "Poor fellow, he's left UT
Austin and gone into the real world."

15. TAC-32/Oncore/DGPS connection

From: "Kelly Jordan" <kjordan@marathon.lakeheadu.ca>
Date: Tue, 7 Jul 1998 22:10:36 +0000
To: tacgps@tapr.org
Message-ID: <199807080210.WAA08354@marathon.Lakeheadu.ca>
Rendered body type: text/plain

I am about to connect the Oncore/DGPS assembly to the computer. Does
the 1pps output (pin 1 on DGPS board) connect to DCD on the PC (pin 1
on 9 pin rs-232 connector on PC)??

- Kelly VE3OTK

16. Re: [TACGPS:1721] TAC-32/Oncore/DGPS connection

From: "Steven R. Bible" <srbible@gate.net>
Date: Wed, 08 Jul 1998 07:53:46 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980708075346.0079c940@pop.gate.net>
Rendered body type: text/plain

At 09:10 PM 7/7/98 -0500, you wrote:
>I am about to connect the Oncore/DGPS assembly to the computer. Does
>the 1pps output (pin 1 on DGPS board) connect to DCD on the PC (pin 1
>on 9 pin rs-232 connector on PC)??

In short, yes. The assembly instructions have you connecting the 1PPS
signal to pin 1 (DCD) of a DB9 connector. If you use the TAC32 software,
TAC32 does not expressly require the signal. If you use the older DOS
program SHOWTIME, then it does need it.

17. Re: [TACGPS:1722] Re: TAC-32/Oncore/DGPS connection

From: "Kelly Jordan" <kjordan@marathon.lakeheadu.ca>
Date: Wed, 8 Jul 1998 19:05:05 +0000
To: tacgps@tapr.org
Message-ID: <199807082304.TAA16399@marathon.Lakeheadu.ca>
Rendered body type: text/plain

> In short, yes. The assembly instructions have you connecting the 1PPS
> signal to pin 1 (DCD) of a DB9 connector. If you use the TAC32 software,
> TAC32 does not expressly require the signal. If you use the older DOS
> program SHOWTIME, then it does need it.

Thanks, Steven. Thats exactly what I wanted to know.

- Kelly VE3OTK

18. Re: [TACGPS:1721] TAC-32/Oncore/DGPS connection

From: "Kelly Jordan" <kjordan@marathon.lakeheadu.ca>
Date: Wed, 8 Jul 1998 19:05:05 +0000
To: tacgps@tapr.org
Message-ID: <199807082304.TAA16402@marathon.Lakeheadu.ca>
Rendered body type: text/plain

> That's what I see on page 5 in the DGPSIB manual
>
> do you need a PDF file of the doc's

Hi bob,

I have the docs. But I just noticed there was a page 8, 9, 10, and
11!!

Stephen's answer what I was looking for.

- Kelly VE3OTK

19. Re: [TACGPS:1723] Re: TAC-32/Oncore/DGPS connection

From: "Steven R. Bible" <srbible@gate.net>
Date: Wed, 08 Jul 1998 19:30:32 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980708193032.00801df0@pop.gate.net>
Rendered body type: text/plain

At 06:07 PM 7/8/98 -0500, you wrote:
>> In short, yes. The assembly instructions have you connecting the 1PPS
>> signal to pin 1 (DCD) of a DB9 connector. If you use the TAC32 software,
>> TAC32 does not expressly require the signal. If you use the older DOS
>> program SHOWTIME, then it does need it.
>
>Thanks, Steven. Thats exactly what I wanted to know.
>
>- Kelly VE3OTK

And I forgot to mention that SA Watch can also set up the DGPSIB and does
not need the 1PPS signal.

Glad you got your answer!

 - Steve
 (n7hpr@tapr.org)

20. Scarce part for QST GPS-VCXO Controller

From: Brooks Shera <ebs@lanl.gov>
Date: Fri, 10 Jul 1998 16:00:10 -0600
To: <tacgps@tapr.org>
Message-ID: <199807102158.PAA08697@newreg.lanl.gov>
Rendered body type: text/plain

Just a note for those who are building the controller
described in my article in the July '98 QST.

The controller has appearently been so popular :-) that Digi-Key is now
out-of-stock of the 24 MHz oscillator chip made by ECS
(DK XC-313) and they are quoting September delivery. When I checked
this morning, Mouser Electronics (800) 346-6873 had 20 units left
in stock. The Mouser part number is 520-DCO2400 and the price is $5.13.

Also, I have added some construction notes, etc to my webpage at
www.rt66.com/~shera.

73, Brooks

21. PicoPacket & DGPS

From: "Kelly Jordan" <kjordan@marathon.lakeheadu.ca>
Date: Sun, 12 Jul 1998 22:22:46 +0000
To: tacgps@tapr.org
Message-ID: <199807130225.WAA08643@marathon.Lakeheadu.Ca>
Rendered body type: text/plain

Am finally trying to get the DGPS working.

First question: Is there any way I can input the DGPS info into the
second port of the PicoPacket so the first port can be used to
monitor packets on the frequency?

Second question: Have another PicoPacket with internal GPS. How do I
get it use the DGPS packets? I think the field after 'W' (west) in
the $GPGGA string goes from 1 (non-DGPS correction) to 2 (DGPS
correction) when it is using DGPS correction. It is staying at 1.

While I am testing, I have the two PicoPackets tied together with the
audio cables. Works fine and don't have to tie up two radios or
clutter the air while testing.

- Kelly VE3OTK

22. Rb group buy offer

From: Tom Van Baak <tvb@veritas.com>
Date: Mon, 13 Jul 1998 16:27:30 -0700
To: tacgps@tapr.org
Message-ID: <35AA97E2.1010@veritas.com>
Rendered body type: text/plain

I was thinking of picking up a few more Rb for myself
and two friends. I was wondering if anyone wanted to
join me this week in a group buy. Corby is offering
them for $375 at a quantity of five and $350 at ten.

$350 for a surplus Efratom M-100 is a really good deal.
They come fully tested, guaranteed, and tuned. He also
includes a complete operating/service manual with each
one.

Thanks,
/tvb

> --------
>
> Wade Lehman has Ball/Efratom FRK-L rubidium oscillators for
> sale at $500. Several TAC-GPS members have purchased these.
> Contact info:
>   Lehman Scientific
>   sales@lehmanscientific.com
>   http://www.lehmanscientific.com/
>   1.800.784.8680
>
> Tom Hamilton has EG&G RFS-10-7 and Efratom M-100 rubidium
> oscillators for sale at $695 (or $500 at quantity 10).
> Contact info:
>   Hamilton Instruments
>   TE@worldnet.att.net
>   http://www.angelfire.com/biz/telist/
>   1.800.862.8983
>
> Corby Dawson also has EG&G RFS-10-7 and Efratom M-100
> rubidium oscillators. Price is $425 each, or $375 for
> quantity 5, or $350 at quantity 10. Several of us have
> purchased Rubidium and Cesium standards from Corby.
> Contact info:
>   Corby Dawson
>   1.805.736.0288
>
> Bernie Goetz has Efratom FRS-C rubidium oscillators. At
> 2x3x4 inches these are about half the size of the M-100
> class oscillator. These have 10 MHz TTL output.
> Contact info:
>   Vigilante Electronics
>   sales@vigilante-electronics.com
>   http://www.vigilante-electronics.com/
>   1.212.243.7964

23. Re: [TACGPS:1728] Rb group buy offer

From: Lyle Johnson <lylej@azstarnet.com>
Date: Mon, 13 Jul 1998 18:07:55 -0700
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980713180755.0090a500@pop.azstarnet.com>
Rendered body type: text/plain

At 06:44 PM 7/13/98 -0500, you wrote:
>I was thinking of picking up a few more Rb for myself
>and two friends. I was wondering if anyone wanted to
>join me this week in a group buy. Corby is offering
>them for $375 at a quantity of five and $350 at ten.

>
>$350 for a surplus Efratom M-100 is a really good deal.
>They come fully tested, guaranteed, and tuned. He also
>includes a complete operating/service manual with each
>one.
>
>Thanks,
>/tvb

If these units are tested/calibrated, then put me down for one. To whom do
I send the check?

Lyle

24. Re: Rb group buy offer

From: "Warren R. Fugate" <wetech@bellatlantic.net>
Date: Tue, 14 Jul 1998 16:50:14 -0400
To: tacgps@tapr.org
Message-ID: <35ABC485.5168A34E@bellatlantic.net>
Rendered body type: text/plain

I have been unable to find complete specifications for the M-100.
EG&G's web site has specs for the FRS-10-7 and it looks like it might be
superior. Does anyone know for certain?

> Date: Mon, 13 Jul 1998 16:27:30 -0700
> From: Tom Van Baak <tvb@veritas.com>
> To: tacgps@tapr.org
> Subject: Rb group buy offer
> Message-ID: <35AA97E2.1010@veritas.com>
>
> I was thinking of picking up a few more Rb for myself
> and two friends. I was wondering if anyone wanted to
> join me this week in a group buy. Corby is offering
> them for $375 at a quantity of five and $350 at ten.
>
> $350 for a surplus Efratom M-100 is a really good deal.
> They come fully tested, guaranteed, and tuned. He also
> includes a complete operating/service manual with each
> one.
>
> Thanks,
> /tvb
>
[snip]
> > Corby Dawson also has EG&G RFS-10-7 and Efratom M-100
> > rubidium oscillators. Price is $425 each, or $375 for
> > quantity 5, or $350 at quantity 10. Several of us have
> > purchased Rubidium and Cesium standards from Corby.
> > Contact info:
> >   Corby Dawson
> >   1.805.736.0288
[snip]
--
Warren R. Fugate W3WE
WE Technologies
wetech@bellatlantic.net

25. Re: [TACGPS:1730] Re: Rb group buy offer

From: Tom Van Baak <tvb@veritas.com>
Date: Tue, 14 Jul 1998 14:21:42 -0700
To: tacgps@tapr.org
Message-ID: <35ABCBE6.2A26@veritas.com>
Rendered body type: text/plain

Warren R. Fugate wrote:
>
> I have been unable to find complete specifications for the M-100.
> EG&G's web site has specs for the FRS-10-7 and it looks like it might be
> superior. Does anyone know for certain?

Corby will fax you the specifications he just obtained
for the EG&G FRS-10-7. I think he said it performed a
little better than the M-100 and certainly uses less
power. Note the EG&G's were made as field replacements
for the M-100 and thus have identical physical and
similar or better operational specs as the M-100.

The short specs I have on the M-100 are:

 o Output: 10 MHz 0.5 Vrms sine wave
 o Input: 22.5 to 32.0 VDC (about 600 mA after warmup)
 o Drift (first year): < 3.6e-10 / year
 o Drift (second year): < 2e-10 / year
 o Short-term stability: 1 sec, 3e-11; 100 sec, 3e-12
 o Frequency trim range: >= 3e-9
 o Settability and retrace: +/- 1e-11
 o Warmup: < 10 min. to +/- 2e-10; < 30 min to +/- 5e-11
 o Temperature (-55C to +68C): < 3e-10
 o Size: 4.8 x 3.9 x 3.9 inches
 o Mass: about 4 lb.

/tvb

26. Re: [TACGPS:1728] Rb group buy offer

From: Tom Van Baak <tvb@veritas.com>
Date: Tue, 14 Jul 1998 14:35:29 -0700
To: tacgps@tapr.org
Message-ID: <35ABCF21.3C25@veritas.com>
Rendered body type: text/plain

Tom Van Baak wrote:
>
> I was thinking of picking up a few more Rb for myself
> and two friends. I was wondering if anyone wanted to
> join me this week in a group buy. Corby is offering
> them for $375 at a quantity of five and $350 at ten.
>
> $350 for a surplus Efratom M-100 is a really good deal.
> They come fully tested, guaranteed, and tuned. He also
> includes a complete operating/service manual with each
> one.
>
> Thanks,
> /tvb

Ok, in less than a day I received 10 offers from people
interested in these Rb oscillators so the group buy is on!
I think it would be best if you now each made your own
call to Corby Dawson (1.805.736.0288) telling him you'd
like the TAC-GPS $350 group buy price. You can arrange
payment and shipping details with him. He has a mix of
EG&G RFS-10-7 and Efratom M-100 units.

/tvb

27. SA CHANGE ?

From: Doug Bade <doug@clecom.com>
Date: Tue, 14 Jul 1998 18:37:35 -0400
To: tacgps@tapr.org
Message-ID: <3.0.32.19980714183733.0068daf4@wingate>
Rendered body type: text/plain

I am watching one of my differentially corrected gps's and I am noting
only 2 satellites showing correction this occurred at about 22:00 utc 7-14.
Is anyone else noticing anything or is my equipment having a problem only
sats 1 and 26 are being corrected. My DGPSD Station seems in order as normal.
        Normally I have 6 or 7 sats with dgps correction depending on correlation
of my oncore DGPS and my Garmin III, let me know if anyone is seeing this,
or my equip is goofing up.. TNX, Doug KB8GVQ

28. Re: [TACGPS:1733] SA CHANGE ?

From: Glenn Little <glittle@awod.com>
Date: Tue, 14 Jul 1998 20:07:40 -0400
To: Doug Bade <doug@clecom.com>, tacgps@tapr.org
Message-ID: <3.0.5.16.19980714200740.327f6d2c@awod.com>
Rendered body type: text/plain

Differential corrections will only apply to the satellites that you AND the
differential beacon station are tracking. If a sat is in your field of
view and not in the field of view of the differential beacon station, you
can get no corrections. Corrections only apply the the sat from which they
were obtained. On the off chance that the beacon station was shielded in
one direction from part of the constallation (sp) and you were shielded
from another part, it is possible that you would have no sats in common and
therefore no corrections possible until the geometry changed.

At 05:45 PM 7/14/98 -0500, you wrote:

>   I am watching one of my differentially corrected gps's and I am noting
>only 2 satellites showing correction this occurred at about 22:00 utc 7-14.
>Is anyone else noticing anything or is my equipment having a problem only
>sats 1 and 26 are being corrected. My DGPSD Station seems in order as normal.
>   Normally I have 6 or 7 sats with dgps correction depending on correlation
>of my oncore DGPS and my Garmin III, let me know if anyone is seeing this,
>or my equip is goofing up.. TNX, Doug KB8GVQ
>
>
>

Glenn Little   glittle@awod.com   QCWA LM 28417
Amateur Callsign: WB4UIV   wb4uiv@amsat.org   AMSAT LM 2178
QTH: Goose Creek, SC USA (EM92xx)   ARRL TAPR
---

29. USNO to Celebrate Millennium with Time Ball

From: gregory.beat@mediaone.net
Date: Tue, 14 Jul 1998 21:31:04 -0500
To: <tacgps@tapr.org>
Message-ID: <00c401bdaf98$a52cac20$37968318@beatgr.ce.mediaone.net>
Rendered body type: text/plain

Since this TAPR group is concerned with time ... an appropriate news
release.

NEWS! from the
NAVAL OBSERVATORY
U.S. Naval Observatory   Public Affairs Office

For Immediate Release.   Press Contact: Dr. Steven J. Dick
8 July 1998   Press Contact: Geoff Chester

U.S. Naval Observatory to Celebrate Millennium with Washington Time Ball

The U.S. Naval Observatory, which maintains the Master Clock of the United States, will usher in the years 2000 and 2001 by dropping a time ball from the telescope dome atop its main building in Washington, D.C.

By order of the Secretary of the Navy, the Naval Observatory dropped the first time ball in the United States in 1845, as the primary means for disseminating time to the city of Washington, and for ships on the Potomac to set their chronometers for navigation. The ball was dropped every day at noon from the Observatory's Foggy Bottom site until 1885, when it was moved to the State, War and Navy Building (now the old Executive Office Building) next to the White House. It was last dropped there in 1936. The dropping of the time ball to usher in the year 2000 will therefore commemorate an old tradition for Washington and the U.S. Navy. It will, however, be dropped at midnight EST on New Year's Eve rather than noon. The event is also part of the White House Millennium Program.

Time balls were used in many cities around the country and around the world during the 19th century. Those in the U.S. were sometimes dropped by a signal from Washington. Beginning in September, 1877 a time ball atop the Western Union Building in New York City was dropped by telegraphic signal from the Naval Observatory. In the era before time zones, the signal for New York was issued 12 minutes before that for Washington to take into account the longitude difference. At the turn of the 20th century dozens of time balls were being dropped around the world. A few are still ceremonially dropped, ranging from New Zealand to the Old Royal Observatory, Greenwich.

The dropping of the time ball to mark the millennium raises the contentious question of when the millennium actually begins. The official answer is clear, if not widely understood: January 1, 2001. This is because there is no year zero. Years of the Gregorian calendar, which is currently in use today, are counted from AD 1. Thus, the 1st century comprised the years AD 1 through AD 100. The second century began with AD 101 and continued through AD 200. By extrapolation we find that the 20th century comprises the years AD 1901-2000. Therefore, the 21st century will begin with 1 January 2001 and continue through 31 December 2100. Similarly, the 1st millennium comprised the years AD 1-1000. The 2nd millennium comprises the years AD 1001-2000. The 3rd millennium will begin with AD 2001 and continue through AD 3000.

But admittedly, all those zeros turning over for the year 2000 is cause for celebration! For this reason, the USNO will drop time balls for both the years 2000 and 2001. There is also a countdown clock on the USNO Millennium Web page at http://www.usno.navy.mil . Among its other millennium

activities,
the Naval Observatory will also hold a symposium in March, 1999 to commemorate the 150th anniversary of the founding of the Nautical Almanac Office, a part of the Naval Observatory since the late 19th century.

Another frequently asked question is whether the year 2000 is a leap year. The answer is yes. The rule, according to the Gregorian reform of 1582, is that years evenly divisible by four are leap years, except for centurial years, which must be evenly divisible by 400. Thus 1700, 1800 and 1900 were not leap years, but 1600 was, and 2000 will be.

The Naval Observatory began as the Depot of Charts and Instruments for the Navy in 1830. From 1844 to 1893 it was located at Foggy Bottom. Since 1893, the Naval Observatory has been located at 34th and Massachusetts Avenue, about 2 miles from the Foggy Bottom site and the center of Washington, D.C.

Determination and dissemination of time have been an essential part of the Naval Observatory mission since its beginning. During that time clock technology has evolved from precision pendulum clocks to quartz crystal clocks to the present hydrogen maser and cesium-beam atomic clocks. Similarly, time dissemination has evolved from the visual signal represented by the time ball, to the telegraph beginning in the 1860s, to radio signals and finally the Global Positioning System (GPS), for which USNO still supplies the time. Clock accuracy has advanced from one-thousandth of a second with the most elaborate pendulum clocks at the beginning of the century, to one billionth of a second per day with the present atomic clocks. Time dissemination, accurate to a few tenths of a second with the time ball, is now accurate to within a few billionths of a second with GPS.

Aside from maintaining the Master Clock of the United States, the Observatory produces star catalogs, astronomical and navigational almanacs, and conducts forefront astronomical research. It is building a "cesium fountain" atomic clock to improve time accuracy ten-fold. It has constructed the Navy Prototype Optical Interferometer, which will help improve the celestial reference system and may discover Earth-size planets. The Observatory accurately measures the rotation of the Earth using radio telescopes around the world. And it continues a variety of efforts to improve navigation by land, sea, air, and space.

For more details on the millennium and USNO millennium activities, visit the USNO Millennium Web site, accessible via the home page or the Public Affairs page. Time ball-related illustrations are available at this site. The USNO Web site also has much information on the Master Clock and other USNO projects. More detailed information on time, calendars and related matters is also found in the Explanatory Supplement to the Astronomical Almanac, ed. P. Kenneth Seidelmann (University Science Books, 1992).

For more details on the Naval Observatory time ball see Ian R. Bartky and Steven J. Dick, "The First North American Time Ball," Journal for the History of Astronomy, 13 (1982), 50-54. On the first time balls in the world, erected in Portsmouth and Greenwich, see Ian R. Bartky and Steven J. Dick, "The First Time Balls," Journal for the History of Astronomy, 12 (1981), 155-74. These articles are available at the web site.

For the spread of time balls in the United States see Ian R. Bartky, "Naval Observatory Time Dissemination Before the Wireless," in Sky with Ocean Joined, Steven J. Dick and LeRoy Doggett, eds. (Washington, 1983), 1-28. The latter contains numerous illustrations of time balls, as does Bartky's article "The Bygone Era of Time Balls," Sky and Telescope (January, 1987), 32-35.

For a comprehensive bibliography on the problem of when a new century begins, see Ruth S. Freitag, The Battle of the Centuries (Library of Congress, Washington, 1995).

NOTE: Illustrations supporting this release are available at
http://www.usno.navy.mil/millrel.html

ILLUSTRATION CAPTIONS:

[Illustration 1]
Earliest evidence of a time ball at the Naval Observatory.
>From Astronomical Observations (1845) of the U. S. Naval Observatory. Washington: J. & S. Gideon, 1846.

[Illustration 2]
Washington time ball.

>From Executive Office Building; General Services Administration Historical
Study No. 3, Washington: Government Printing Office, 1970

[Illustration 3]
>From Harper's New Monthly Magazine, 56 (1878), 655-71

G. Beat
W9GB

30. USNO to Celebrate Millennium with Time Ball

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Wed, 15 Jul 1998 10:41:04 -0400
To: "TAC-2 mail list" <tacgps@tapr.org>
Message-ID: <000001bdaffe$9814dce0$5f1d5c18@john.tampabay.rr.com>
Rendered body type: text/plain

Greg --

Very, very interesting reading. Thanks for posting it.

73 John W4SF

31. Another Scarce part for QST GPS-VCXO Controller

From: Brooks Shera <ebs@lanl.gov>
Date: Wed, 15 Jul 1998 10:39:20 -0600
To: <tacgps@tapr.org>
Message-ID: <199807151637.KAA19536@newreg.lanl.gov>
Rendered body type: text/plain

Just a note for those who are building the controller
described in my article in the July '98 QST

The controller has appearently been so popular :-) that Digi-Key is now
out-of-stock of ANOTHER part: the Burr-Brown PCM-61P.

I find Arrow Electronics (800) 833-3557 has the PCM61P is stock ($9.47).
When I called they had 15 left. Arrow has a $25 min. order but if you
talk to Sherria (ext. 4031) and order something else besides the chip
she might not hold you to $25.

Another source is Sager Electronics (800) 677-7716. They have 207
in stock, but a $100 min. order!

For those that haven't seen it yet I should mention that, I have
added some construction notes, etc to my webpage at www.rt66.com/~shera.

Write an article for QST and become a purchasing agent!

73, Brooks

32. RE: [TACGPS:1735] USNO to Celebrate Millennium with Time Ball

From: "Harry Burford" <hburford@airmail.net>
Date: Wed, 15 Jul 1998 13:23:20 -0500
To: <tacgps@tapr.org>
Message-ID: <000001bdb01d$a5c2f740$ac1c658f@burford>
Rendered body type: text/plain

Two Roman bankers were talking back in the year one.
One turns to the other and says,
"here it is April already and I'm still writing zero on all my checks!"

I don't think there is any way to educate the world that 2001 starts the new
millennium and not 2000. This has been a constant source for argument.
Best comment was to ask the 2000 proponent to assume a child was born in
1981. What year do you celebrate that childs 10th birthday? Then relate
the answer back to the calendar starting at 1. The USNO doing a celebration
of both 2000 and 2001 is an extremely good decision.

HB - KA0TTY

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org] On Behalf Of
gregory.beat@mediaone.net
Sent: Tuesday, July 14, 1998 9:32 PM
To: tacgps@tapr.org
Subject: [TACGPS:1735] USNO to Celebrate Millennium with Time Ball

Since this TAPR group is concerned with time ... an appropriate news
release.

NEWS! from the
NAVAL OBSERVATORY
U.S. Naval Observatory   Public Affairs Office

For Immediate Release.   Press Contact: Dr. Steven J. Dick
8 July 1998   Press Contact: Geoff Chester

U.S. Naval Observatory to Celebrate Millennium with Washington Time Ball

The U.S. Naval Observatory, which maintains the Master Clock of the United
States, will usher in the years 2000 and 2001 by dropping a time ball from
the telescope dome atop its main building in Washington, D.C.

        *** text deleted in the reply to save space ***

NOTE: Illustrations supporting this release are available at
http://www.usno.navy.mil/millrel.html

ILLUSTRATION CAPTIONS:

[Illustration 1]
Earliest evidence of a time ball at the Naval Observatory.
>From Astronomical Observations (1845) of the U. S. Naval Observatory.
Washington: J. & S. Gideon, 1846.

[Illustration 2]
Washington time ball.
>From Executive Office Building; General Services Administration Historical
Study No. 3, Washington: Government Printing Office, 1970

[Illustration 3]
>From Harper's New Monthly Magazine, 56 (1878), 655-71

G. Beat
W9GB

33. Dinner w/ Greg in KS ;-)

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Thu, 16 Jul 1998 09:43:23 -0600
To: "APRS SIG list   mailing"<aprssig@tapr.org>,
        "NETSIG list   mailing"<netsig@tapr.org>, " tacgps "<tacgps@tapr.org>
Message-ID: <v04011701b1d3cf2a58a5@[169.203.249.107]>
Rendered body type: text/plain

A time and date has been set.

This weekend it will be. Sunday, 18 July, 5:30 pm at Free State Brewery,
downtown Lawrence, KS (in that town with the "other" Kansas University as
Lloyd Verhage stated).

Sunday is my only free night while teaching.

If you are coming, be sure to rsvp with lloyd (verhage@humec.ksu.edu)

Cheers - Greg, WD5IVD

Greg Jones, WD5IVD   Austin, Texas
wd5ivd@tapr.org   http://www.tapr.org/~wd5ivd

34. Re: Dinner w/ Greg in KS ;-)

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Thu, 16 Jul 1998 18:59:38 -0600
To: netsig@tapr.org
Cc: "APRS SIG list   mailing"<aprssig@tapr.org>, " tacgps "<tacgps@tapr.org>
Message-ID: <v04011706b1d452294e0d@[169.203.249.107]>
Rendered body type: text/plain

Hi Sid.

I took the date from someone else without looking. It is Sunday, not
matter what date got listed.

Greg

>
>Well .... is it Sunday (the 19th) or Saturday (the 18th)???   :-)
>
>Sid Ashen-Brenner   Salina, Ks.   Monitor Service Co.
>Internet : sashen@midusa.net
>AX-25 : n0obm @ n0obm.#ncks.ks.usa.noam

Greg Jones, WD5IVD   Austin, Texas
wd5ivd@tapr.org   http://www.tapr.org/~wd5ivd

35. Rockwell Jupiter GPS

From: Kelly Jordan <kjordan@compuserve.com>
Date: Sun, 19 Jul 1998 09:54:21 -0400
To: Blind.Copy.Receiver@compuserve.com
Message-ID: <199807190954_MC2-5388-E771@compuserve.com>
Rendered body type: text/plain

Has anybody done a comparison of the Rockwell Jupiter GPS board against
the Motorola Oncore VP in terms of DGPS useage?

- Kelly VE3OTK

36. Datums and Oncore

From: Kelly Jordan <kjordan@compuserve.com>
Date: Sun, 19 Jul 1998 09:54:18 -0400
To: Blind.Copy.Receiver@compuserve.com
Message-ID: <199807190954_MC2-5388-E770@compuserve.com>
Rendered body type: text/plain

When the Motorola Oncore is set up with TAC32 to do DGPS, what Datum is
it using? I think it is using WGS84, but am not certain.

- Kelly VE3OTK

37. RE: [TACGPS:1742] Datums and Oncore

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sun, 19 Jul 1998 10:14:35 -0400
To: <tacgps@tapr.org>
Message-ID: <001901bdb31f$8eb7a500$101161cf@rick.cnssys.com>
Rendered body type: text/plain

Yes, it is using WGS84.

Rick, WB2TNL

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Kelly Jordan
Sent: Sunday, July 19, 1998 10:00 AM
To: tacgps@tapr.org
Subject: [TACGPS:1742] Datums and Oncore

When the Motorola Oncore is set up with TAC32 to do DGPS, what Datum is
it using? I think it is using WGS84, but am not certain.

- Kelly VE3OTK

38. Re: [TACGPS:1743] RE: Datums and Oncore

From: "Steven R. Bible" <srbible@gate.net>
Date: Sun, 19 Jul 1998 12:22:39 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980719122239.0079a9a0@pop.gate.net>
Rendered body type: text/plain

The default datum setting for the Oncore is WGS84. You can change it if
you want. FOr DGPS, you want both the reference station and remote
receivers using the same datum.

- Steve

At 09:15 AM 7/19/98 -0500, you wrote:
>Yes, it is using WGS84.
>

>Rick, WB2TNL
>
>-----Original Message-----
>From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Kelly Jordan
>Sent: Sunday, July 19, 1998 10:00 AM
>To: tacgps@tapr.org
>Subject: [TACGPS:1742] Datums and Oncore
>
>
>When the Motorola Oncore is set up with TAC32 to do DGPS, what Datum is
>it using? I think it is using WGS84, but am not certain.
>
>- Kelly VE3OTK
>
>

39. Centennial PCMCIA SatNav GPS Card

From: "Eric A. Cottrell" <eac@shore.net>
Date: Sun, 19 Jul 1998 20:28:29 -0400
To: tacgps@tapr.org
Message-ID: <35B28F2D.7069@shore.net>
Rendered body type: text/plain

Hello,

I think I am getting as bad as Doc Tom in regards to my
GPS collection. I already have Garmins (45, 12xl, GPS-10),
and a Delorme Tripmate (Rockwell Zodiac Chipset).
A man with one GPS reciever knows where he is, a man
with two GPS receivers is never sure.

So I was at the MIT fleamarket today and saw someone
selling GPS receivers that nearly fits in a PCMCIA slot
(the antenna part of it sticks out of the laptop).
No indication of who really made it on the box but I
figure for $75 I would take a chance.

It is a Rockwell card and it included the optional
6' mag mount and cable attachment! I did some searching
on it and it appears to be a 9 channel receiver
multiplexed (5 actual channels) based on Rockwell NavCore.
The card looks like a serial port software-wise.

One "problem" is the data output is Rockwell Binary
(I have some docs). Fortunely SA 5.0 can understand
this format but can not display the number of satellites
it is seeing, what satellites it sees, etc. No chance of
APRS usage. The other "problem" is it does not seem
to provide 5 volts on the antenna input so active
antennas are out.

I tried it out and it took awhile for a cold-search.
It seemed to work better with the antenna on the
magnetic mount. I ran a short road test with
the mag mount on top. I was droping into 2-D
and ocassional loss of signal. I would put the
performance between that of the 45 and the 12xl.
It is kinda neat to have a small and simple
setup to work with my laptop. I suppose I could
get one of the GPS ready TNCs and run my 12xl
in that while runing the Centennial into SA5.
Too bad the Mic-E does not have a PCMCIA slot 8->.

So does anyone have any more information, tips,
etc, about this card? It seems Rockwell has
taken off information on this card from their
website. Centennial has very little info as well.
Can the firmware in it be updated?

Is it worth $75? I thought based on a 12 channel
tripmate going for $135 or so that a 5 channel
for $75 was about right. Unfortunely old
GPS receivers seem to be cheap these days
but this seemed to have some added value
due to the PCMCIA form factor.

73 Eric eac@shore.net WB1HBU

40. Re: [TACGPS:1745] Centennial PCMCIA SatNav GPS Card

From: Garwood745@aol.com
Date: Mon, 20 Jul 1998 21:00:59 EDT
To: tacgps@tapr.org
Message-ID: <24c324cc.35b3e84c@aol.com>
Rendered body type: text/plain

I have the same card, i bet on my magellan pathmaster (the car nav unit) that
i sell at one of my stores. I will call magellan this week. what do you have
for a model number?
I have been looking for data on this card for some time.

gary woodward
hurley's auto audio
McLean, va.

41. tiny connector pins needed

From: Bryan Mumford <bryan@bmumford.com>
Date: Wed, 22 Jul 1998 10:38:49 -0800
To: tacgps@tapr.org
Message-ID: <v03007801b1dbe1940210@[207.71.222.144]>
Rendered body type: text/plain

I have one of the GPS-30 receivers and I need to add a line for the 1 pps
signal. However, I don't have any tiny crimp connector nearly small enough
to go into that housing. Can someone mail me two or three of these at some
cost, or can you direct me to a DigiKey part number?

Bryan Mumford
Santa Barbara, California
http://www.bmumford.com

42. Re: [TACGPS:1747] tiny connector pins needed

From: "Ronald G. Parsons" <w5rkn@amsat.org>
Date: Wed, 22 Jul 1998 14:23:52 -0500
To: tacgps@tapr.org
Message-ID: <35B63C48.107EDEAE@amsat.org>
Rendered body type: text/plain

Have you checked with the TAPR office?

Bryan Mumford wrote:
>
> I have one of the GPS-30 receivers and I need to add a line for the 1 pps
> signal. However, I don't have any tiny crimp connector nearly small enough
> to go into that housing. Can someone mail me two or three of these at some
> cost, or can you direct me to a DigiKey part number?
>
> Bryan Mumford
> Santa Barbara, California
> http://www.bmumford.com

--
Ron Parsons
W5RKN

43. Re: [TACGPS:1747] tiny connector pins needed

From: "Doug McKinney" <buoy@redshift.com>
Date: Sat, 25 Jul 1998 08:19:40 -0700
To: <tacgps@tapr.org>
Message-ID: <000e01bdb7df$a9111160$73c6cccf@buoy.mcktech.com>
Rendered body type: text/plain

-----Original Message-----
From: Bryan Mumford <bryan@bmumford.com>
To: tacgps@tapr.org <tacgps@tapr.org>
Date: Wednesday, July 22, 1998 11:00 AM
Subject: [TACGPS:1747] tiny connector pins needed

>I have one of the GPS-30 receivers and I need to add a line for the 1 pps
>signal. However, I don't have any tiny crimp connector nearly small enough
>to go into that housing. Can someone mail me two or three of these at some
>cost, or can you direct me to a DigiKey part number?
>
>
>Bryan Mumford
>Santa Barbara, California

>http://www.bmumford.com
>
Bryan, send me your address and I will send you 2 connectors crimped to
wires, at no cost. Your inventions are really creative and neat. Are you
marketing your toys or just building a few for fun?
Doug KC3RL
(408)663-4999

44. Scarce part for QST GPS-VCXO Controller

From: Brooks Shera <ebs@lanl.gov>
Date: Tue, 28 Jul 1998 16:31:40 -0600
To: <tacgps@tapr.org>
Message-ID: <199807282229.QAA06756@newreg.lanl.gov>
Rendered body type: text/plain

Just a note for those who are building the controller
described in my article in the July '98 QST

The Burr-Brown DAC PCM16P is now out of stock at DigiKey, Arrow,
AND Sager Electronics.

However, B-B is still making them, contrary to what DigiKey will
tell you. The only source at the moment is Insight Electronics
(800) 677-7716. They have the PCM61K version (170 in stock),
which has higher specs according to B-B and should work fine in
the controller. The bad news is it costs a bit more ($14.20),
but the good news is that Insight has no minimum order.

I am trying to get DigiKey to restock the 61P since they seem to
sell out pretty fast but I may not have any luck. If anyone
has a contact with influence at DigiKey please let me know.

Brooks

45. Re: [TACGPS:1750] Scarce part for QST GPS-VCXO Controller

From: Tom Van Baak <tvb@veritas.com>
Date: Tue, 28 Jul 1998 16:57:34 -0700
To: tacgps@tapr.org
Message-ID: <35BE656E.66EA@veritas.com>
Rendered body type: text/plain

Brooks Shera wrote:
>
> Just a note for those who are building the controller
> described in my article in the July '98 QST
>
> The Burr-Brown DAC PCM16P is now out of stock at DigiKey, Arrow,
> AND Sager Electronics.

You sure picked an interesting way to find out how many
people are building your kit. ;-)

How many PCBs has A&A sold?

/tvb

46. GPS controller as TAPR kit?

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Wed, 29 Jul 1998 09:53:23 -0400
To: "TAC-2 mail list" <tacgps@tapr.org>
Message-ID: <000001bdbaf8$40dca660$5f1d5c18@john.tampabay.rr.com>
Rendered body type: text/plain

Looks like the popularity of Brooks Shera's GPS controller has produced a
shortage of critical parts. The demand for parts has evidently exceeded the
supply. Might be a good idea for TAPR to locate the necessary parts and
order a large supply. I believe a TAPR kit would be extremely popular and be
a good fund raiser. Should be just as popular as the TAC-2 and other TAPR
kits. Brooks might even offer 24-hour toll-free tech support as part of the
deal (just kidding, Brooks).

73 John W4SF

47. Re: [TACGPS:1751] Re: Scarce part for QST GPS-VCXO Controller

From: Brooks Shera <ebs@lanl.gov>
Date: Wed, 29 Jul 1998 12:27:09 -0600
To: <tacgps@tapr.org>
Message-ID: <199807291824.MAA11819@newreg.lanl.gov>

Rendered body type: text/plain

Tom Van Baak wrote:

>Brooks Shera wrote:
>>
>> Just a note for those who are building the controller
>> described in my article in the July '98 QST
>>
>> The Burr-Brown DAC PCM16P is now out of stock at DigiKey, Arrow,
>> AND Sager Electronics.
>
>You sure picked an interesting way to find out how many
>people are building your kit. ;-)
>
>How many PCBs has A&A sold?

Last time I checked with Stas at A&A the article had been out
about 2-3 weeks and he was approaching 100 sold. Since then
I don't know, but requests to me for programmed PICs have been
pretty constant. Stas said to expect a big surge when
QST gets to Europe, etc in 2-3 months. Apparently
non-US hams are the more active builders these days.

Brooks

48. Help finding source for Z85C30 SCC

From: John Ackermann N8UR <jra@febo.com>
Date: Thu, 30 Jul 1998 20:27:57 -0400
To: tacgps@tapr.org, net-sig@tapr.org, tcp-group@ucsd.edu
Message-ID: <199807310027.UAA12935@meow.febo.com>
Rendered body type: text/plain

Sorry for the slightly off-topic post, but I have an Ottawa PI card
with a blown Z85C30 SCC chip, and I'm having a devil of a time finding
a source for a replacement.   Neither Digikey, Jameco, nor Mouser show
it in their indexes.

Any ideas of who stocks these things and is willing to sell in small
quantities?

Thanks,

John N8UR
jra@febo.com
http://www.febo.com

49. Re: [TACGPS:1754] Help finding source for Z85C30 SCC

From: Glenn Little <glittle@awod.com>
Date: Thu, 30 Jul 1998 20:53:19 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.16.19980730205319.32270d76@awod.com>
Rendered body type: text/plain

Is a Zilog Z8030 CS Z-SCC the same? Package 40 pin ceramic.

At 07:30 PM 7/30/98 -0500, you wrote:
>Sorry for the slightly off-topic post, but I have an Ottawa PI card
>with a blown Z85C30 SCC chip, and I'm having a devil of a time finding
>a source for a replacement.   Neither Digikey, Jameco, nor Mouser show
>it in their indexes.
>
>Any ideas of who stocks these things and is willing to sell in small
>quantities?
>
>Thanks,
>
>John N8UR
>jra@febo.com
>http://www.febo.com
>
>
>
>

Glenn Little   glittle@awod.com   QCWA LM 28417
Amateur Callsign: WB4UIV   wb4uiv@amsat.org   AMSAT LM 2178
QTH: Goose Creek, SC USA (EM92xx)   ARRL TAPR

---

50. Re: [TACGPS:1755] Re: Help finding source for Z85C30 SCC

From: John Ackermann N8UR <jra@febo.com>
Date: Fri, 31 Jul 1998 07:57:57 -0400
To: tacgps@tapr.org
Message-ID: <199807311157.HAA14967@meow.febo.com>
Rendered body type: text/plain

Not sure -- this is the CMOS version of the Z8530 SCC; don't know if
the "CS" means the same thing or not.

John

In message <3.0.5.16.19980730205319.32270d76@awod.com>, Glenn Little writes:
>Is a Zilog Z8030 CS Z-SCC the same? Package 40 pin ceramic.
>
>At 07:30 PM 7/30/98 -0500, you wrote:
>>Sorry for the slightly off-topic post, but I have an Ottawa PI card
>>with a blown Z85C30 SCC chip, and I'm having a devil of a time finding
>>a source for a replacement.   Neither Digikey, Jameco, nor Mouser show
>>it in their indexes.
>>
>>Any ideas of who stocks these things and is willing to sell in small
>>quantities?
>>
>>Thanks,
>>
>>John N8UR
>>jra@febo.com
>>http://www.febo.com
>>
>>
>>
>>
>--
>Glenn Little   glittle@awod.com   QCWA LM 28417
>Amateur Callsign: WB4UIV   wb4uiv@amsat.org   AMSAT LM 2178
>QTH: Goose Creek, SC USA (EM92xx)   ARRL TAPR
>--

August 1998

Original source file: tacgps.9808
Source: http://ftp.tapr.org/product_docs/TAC2/mail_archives/tacgps.9808

1. Re: [TACGPS:1756] Re: Help finding source for Z85C30 SCC

From: Lyle Johnson <lylej@azstarnet.com>
Date: Sat, 01 Aug 1998 15:36:37 -0700
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980801153637.008e0350@pop.azstarnet.com>
Rendered body type: text/plain

The 8030 is most assuredly NOT the same as the 8530.

AMD and Zilog make CMOS 8530 parts. No one ever made a CMOS 8030...

Lyle

---

2. Re: [TACGPS:1753] Re: Scarce part for QST GPS-VCXO Controller

From: Gary Sanders <gsanders@gte.net>
Date: Sun, 02 Aug 1998 15:44:35 -0400
To: tacgps@tapr.org
Message-ID: <35C4C1A3.880CFDD5@gte.net>
Rendered body type: text/plain

Just a quick comment - Brooks' controller kit works as advertised,
as long as you FOLLOW BROOKS' DIRECTIONS and don't try a
combination of REALLY STUPID THINGS. And, by the way, Brooks doesn't
even say "Hey stupid, do you expect this thing to do the
impossible?", as I can testify he has every right to.

First problem - a 74HC4046 will NOT sub for the 74HCT4046 in Q3
(ask me how I know this to be a fact).

Second problem - You have a fair amount of phase jitter when you
try to use the system with the antenna INSIDE the house. Gee, I
wonder why that is?

Third problem - You also have a fair amount of phase jitter when
you forget to put the GPS20 in 2D mode.

After correcting these admittedly dumb errors, the unit appears to
operate beautifully, and I can quit pestering Brooks.

Brooks, I publicly say THANK YOU for all of the help you've offered,
and thanks for a really great project.

Gary Sanders   WB0BZR

Brooks Shera wrote:
>

>
> Last time I checked with Stas at A&A the article had been out
> about 2-3 weeks and he was approaching 100 sold. Since then
> I don't know, but requests to me for programmed PICs have been
> pretty constant. Stas said to expect a big surge when
> QST gets to Europe, etc in 2-3 months. Apparently
> non-US hams are the more active builders these days.
>
> Brooks

---

3. Re: [TACGPS:1748] TACGPS digest 287

From: Scott Szretter <ss@posoe.com>
Date: Tue, 4 Aug 1998 08:41:03 -0500
To: tacgps@tapr.org
Message-ID: <v03130301b1ecbf3d77fa@[38.244.114.103]>
Rendered body type: text/plain

Im looking into GPS units for use in my car when going on trips, and other uses, and so far have tried
using two store bought units:

TripMate - works SOMEWHAT - not reliable.

CoPilot - didnt seem to work at all - there was a data stream, but never syncronized.

I have software that will interface with gps units for both mac and windows, so now im just looking to find a gps unit that is reliable - good reception, etc. at a reasonable price.

Any suggestions/information greatly appriciated.

Thanks!

Scott Szretter
N1VAN

4. Low cost GPS for computer AND standalone?

From: Scott Szretter <ss@posoe.com>
Date: Tue, 4 Aug 1998 15:29:17 -0500
To: tacgps@tapr.org
Message-ID: <v03130305b1ed1f540ce4@[38.244.114.103]>
Rendered body type: text/plain

Im looking for a low cost GPS unit that is decent for performance, and can be hooked to the computer for aprs, etc. and also can be used as a stand alone unit without a computer.

Any recommendations would be greatly appriciated.

Thanks.

Scott Szretter
N1VAN

5. RE: [TACGPS:1759] Re: TACGPS digest 287

From: "Adams, Craig F" <craig.adams@compaq.com>
Date: Tue, 4 Aug 1998 14:36:02 -0500
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <A3B17911085AD111901100805FBEFAB0D0B84A@exccup-25004.mis.tandem.com>
Rendered body type: text/plain

My TripMate has always worked well.

I also have a Garmin GPSIII that is great. Fast and easy to use. It does eat batteries though.

> -----Original Message-----
> From: Scott Szretter [SMTP:ss@posoe.com]
> Sent: Tuesday, August 04, 1998 12:00
> To: tacgps@tapr.org
> Subject: [TACGPS:1759] Re: TACGPS digest 287
>
> Im looking into GPS units for use in my car when going on trips, and other
> uses, and so far have tried using two store bought units:
>
> TripMate - works SOMEWHAT - not reliable.
>
> CoPilot - didnt seem to work at all - there was a data stream, but never
> syncronized.
>
>
> I have software that will interface with gps units for both mac and
> windows, so now im just looking to find a gps unit that is reliable - good
> reception, etc. at a reasonable price.
>
>
> Any suggestions/information greatly appriciated.
>
> Thanks!
>
> Scott Szretter
> N1VAN
>

6. Re: [TACGPS:1759] Re: TACGPS digest 287

From: "Paul J. Beckmann" <paul@eye.psych.umn.edu>
Date: Tue, 04 Aug 1998 15:26:58 -0500
To: tacgps@tapr.org
Message-ID: <35C76E92.3BEA@eye.psych.umn.edu>
Rendered body type: text/plain

Hi, Scott.
I use my Garmin GPS-48, a marine-handheld 12-channel unit on the dash of my Ford E-150 van. Have had great luck with acquisition

without an external antenna -- BUT -- if I needed to the 48's
antenna disconnects and allows connection of something like a
Trimble puck on the roof.
  I have the Garmin bracket velcro-ed to the dash and the power/data
connector (comes out with DB-9 serial connector and a Cig lighter
plug-in.) Went up and back to Alberta from MN and had no loss
of satellites. Have travelled around the MPLS/STPaul area with
good luck as well.
--Paul Beckmann, wa0rse@amsat.org

7. GPS on Bicycles

From: SBCmusic@aol.com
Date: Tue, 4 Aug 1998 16:58:02 EDT
To: tacgps@tapr.org
Message-ID: <21693de1.35c775db@aol.com>
Rendered body type: text/plain

Hi all,

I'm new to the list, first of all....I'm Rick Garrett, N9GSU, in Muncie,
Indiana.

Among other things, I'm an avid bicyclists. I do mostly road riding, with
some light off road and trail riding.

Recently purchased a Garmin GPSIII, and have ordered the bicycle mounting
bracket. Has anyone on the list experience with this? When riding off road,
is vibration any problem?

Thanks,

Rick

8. Re: TripMate - SOMEWHAT - not reliable.

From: Bob Winingham <kc5ejk@onramp.net>
Date: Tue, 4 Aug 1998 17:17:34 -0500
To: tacgps@tapr.org
Message-ID: <v04003a00b1ed384d90a9@[206.50.200.69]>
Rendered body type: text/plain

>Im looking into GPS units for use in my car when going on trips, and other
>uses, and so far have tried using two store bought units:
>
>TripMate - works SOMEWHAT - not reliable.
>

try the GPSy software (MAC) www.gpsy.com

and report back if your trimmate is not working correctly.

A cold boot takes some time but works well after that.

If you have metal in your windowscreen now is the time to find out.

73

9. Re: [TACGPS:1763] GPS on Bicycles

From: "Richard Garcia" <k4gps@bellsouth.net>
Date: Tue, 4 Aug 1998 18:15:02 +0000
To: tacgps@tapr.org
Cc: SBCmusic@aol.com
Message-ID: <199808042215.SAA21242@mail.mia.bellsouth.net>
Rendered body type: text/plain

I purchased a GPS III myself last week while on vaction when my GPS45
died. When walking away from the Electronics Section of West Marine I
noticed that handlebar mount and I think it is the neatest thing for
$25!

I had already spent too much money so what is another $25. When I
got to the hotel I exited the truck with a philips screwdriver in
hand and within 1 minute I had my GPS III mounted on my Harley
Davidson. I have about 300 miles of rough country backroads on it now
while visiting the FL Panhandle and it worked great. After about 200
miles the bracket got loose but I put a drop of blue locktight on it
when I got back to my truck and all is fine.

The GPS III is much easyer to read than a road map while going down

the highway at 70mph!<grin>I just love it and it is great to be able
to save all my tracks and add them to a Street Atlas 5 file when I
return. Now I will have a file of all roads driven while on the Hog.

> Date: Tue, 4 Aug 1998 16:13:19 -0500 (CDT)
> Reply-to: tacgps@tapr.org
> From: SBCmusic@aol.com
> To: tacgps@tapr.org
> Subject: [TACGPS:1763] GPS on Bicycles

> Hi all,
>
> I'm new to the list, first of all....I'm Rick Garrett, N9GSU, in Muncie,
> Indiana.
>
> Among other things, I'm an avid bicyclists. I do mostly road riding, with
> some light off road and trail riding.
>
> Recently purchased a Garmin GPSIII, and have ordered the bicycle mounting
> bracket. Has anyone on the list experience with this? When riding off road,
> is vibration any problem?
>
> Thanks,
>
> Rick
>
>
>
k4gps@bellsouth.net Ex: N2CZF KA2FXA
Jupiter Farms FL.
http://aprs.florida.net
http://www.radiotronics.com

10. Re: [TACGPS:1763] GPS on Bicycles

From: coldwell@cfaiota0.harvard.edu
Date: Tue, 4 Aug 1998 18:45:26 -0400
To: tacgps@tapr.org
Message-ID: <199808042245.SAA01897@cfaiota0.harvard.edu>
Rendered body type: text/plain

Just finished a bicycle ride two weeks ago from Tucson to Albuquerque
with my Magellan 2000XL. I didn't run it continuously, but used it to
get a fix every evening on the six day ride. I was actually pretty
disappointed with the altitude measurements, which seemed to be much
less accurate than the lat/long, and disagreed with topographical maps
and road signs by disturbing amounts. The ride went from a nadir of
2050 feet elevation to a summit of 7550, and the Magellan was
sometimes off by 500 feet or more and never held a consistent value.
As I am sure you are aware, bicyclists are very interested in accurate
measurements of altitude, perhaps even more than lat/long. I would be
interested to learn how your Garmin compares, although I suppose there
isn't much interesting topography around Muncie.

--

Charles M. Coldwell
Harvard-Smithsonian Center for Astrophysics
60 Garden St. MS #20
Cambridge, MA 02138
(617) 495-7491

11. Re: [TACGPS:1759] Re: TACGPS digest 287

From: JRinIA@aol.com
Date: Tue, 4 Aug 1998 23:33:56 EDT
To: tacgps@tapr.org
Message-ID: <b81af646.35c7d2a5@aol.com>
Rendered body type: text/plain

I've got a Tripmate, use it with APRS Kantronics 3+, also with my Palm Pilot
Organizer. The only problems I've had were with the cigar plug adapter
falling out and running down the internal batteries in the Tripmate...

What kind of problems are you having?

JR

N0YQO

12. Re: [TACGPS:1763] GPS on Bicycles

From: "Pete Prossen" <prossen@znet.com>
Date: Tue, 4 Aug 1998 21:47:37 -0700
To: <tacgps@tapr.org>
Message-ID: <199808050503.WAA23958@sd.znet.com>
Rendered body type: text/plain

My wife and I have GPS III's on our motorcycles (Viragos), which we ride through the backroads of San Diego County. I made the mounting plates from a piece of
aluminum and two plastic 3/4" conduit clamps. Vibration may not be as severe as a bicycle on a cobblestone road, but we've had absolutely no problems. The GPS III is the nicest unit I've seen, but I have yet to get my eyes on the new Street Pilot.

Everyone I know with a GPS III says they are hard on batteries. As you may know, the unit tracks the amount of battery life for each set. My current set is at 13.5 hours with about "1/4 tank" left on the "fuel guage". I use the cheap Kirkland brand alkaline cells from Costco.

Regards and happy biking . . .

Pete (and Elaine) Prossen
WA6ZUH and WB6ZUH

13. Re: [TACGPS:1766] Re: GPS on Bicycles

From: "Doug McKinney" <buoy@redshift.com>
Date: Tue, 4 Aug 1998 22:06:16 -0700
To: <tacgps@tapr.org>
Message-ID: <003c01bdc02e$c8aab060$a1c6cccf@buoy.mcktech.com>
Rendered body type: text/plain

-----Original Message-----
From: coldwell@cfaiota0.harvard.edu <coldwell@cfaiota0.harvard.edu>
To: tacgps@tapr.org <tacgps@tapr.org>
Date: Tuesday, August 04, 1998 3:56 PM
Subject: [TACGPS:1766] Re: GPS on Bicycles

>
>Just finished a bicycle ride two weeks ago from Tucson to Albuquerque
>with my Magellan 2000XL. I didn't run it continuously, but used it to
>get a fix every evening on the six day ride. I was actually pretty
>disappointed with the altitude measurements, which seemed to be much
>less accurate than the lat/long, and disagreed with topographical maps
>and road signs by disturbing amounts. The ride went from a nadir of
>2050 feet elevation to a summit of 7550, and the Magellan was
>sometimes off by 500 feet or more and never held a consistent value.
>As I am sure you are aware, bicyclists are very interested in accurate
>measurements of altitude, perhaps even more than lat/long. I would be
>interested to learn how your Garmin compares, although I suppose there
>isn't much interesting topography around Muncie.
>
>--
With GPS your LAT/LON is 95% within 100m (600ft diameter) radius of true position. Altitude is the least accurate of the GPS outputs and can be 200m (1200ft diameter) radius from true altitude! This will be seen in all GPS units. DGPS will significantly improves the result, but the altitude will always be the least accurate.
73's
Doug

>
>Charles M. Coldwell
>Harvard-Smithsonian Center for Astrophysics
>60 Garden St. MS #20
>Cambridge, MA 02138
>(617) 495-7491
>

14. TAC-2, Oncore VP & Motorola GPS antenna: What am I missing?

From: Terje Mathisen <Terje.Mathisen@hda.hydro.com>
Date: Wed, 05 Aug 1998 08:14:30 +0200
To: tacgps@tapr.org
Message-ID: <35C7F846.5AA4@hda.hydro.com>

Rendered body type: text/plain

I started yesterday evening putting together the TAC-2 kit, and
everything seems to have worked out very nicely.

Finally however, after passing all the intermediate tests, I got to the
point where I should connect the antenna and turn on power for the first
time.

At this point it became very obvious that the small (frictionbased?)
antenna connector on the Oncore board isn't compatible with the BNC
antenna cable connector! :-(

I obviously need to locate the parts for an adapter.

So, what is the proper specification for the connector used on the
Oncore? I noticed that the TAPR order forms lists an MCX Rt-Angle
Connector w/ coax pigtail, is this what I should have ordered?

Finding this part here in Norway will probably be problematical. :-(

Terje, la8nw

--
- <Terje.Mathisen@hda.hydro.com>
Using self-discipline, see http://www.eiffel.com/discipline
"almost all programming can be viewed as an exercise in caching"

15. Re: cigar plug adapter

From: Robert Winingham <kc5ejk@onramp.net>
Date: Wed, 5 Aug 1998 23:08:38 -0600
To: tacgps@tapr.org
Message-ID: <v03102800b1eeddbda60a@[206.50.201.38]>
Rendered body type: text/plain

>I've got a Tripmate, use it with APRS Kantronics 3+, also with my Palm Pilot
>Organizer. The only problems I've had were with the cigar plug adapter
>falling out and running down the internal batteries in the Tripmate...
>

They make cigar plugs that have a ring you push forward that expands
andit holds much better. I also add a small LED to the cigar plug.

My problem was the laptop computer draining the internal batteries and
doing a fast shutdown while APRS tracking.

73

Bob - Dallas,TX --- kc5ejk@onramp.net or kc5ejk@amsat.org ---

16. Re: [TACGPS:1771] Re: cigar plug adapter

From: JRinIA@aol.com
Date: Thu, 6 Aug 1998 10:04:56 EDT
To: tacgps@tapr.org
Message-ID: <bb185bb2.35c9b809@aol.com>
Rendered body type: text/plain

Thanks for the info n the tripmate plug--haven't seen any like it up here, but
will ask around. As for the notebook issue, I used to have the battery
problem with mine, even with Lithium/Ion battery. I now use a power inverter
with mine in the Explorer and it works well. Seems to keep the power steady
and the battery charged. This also means that with the radar detector, cell
phone, Kenwood TMV-7A, tripmate and APRS Radio/Kantronics adapter, power
inverter/notebook computer and battery powered cooler (for long trips), the
drain can be significant on the battery if it isn't running!

73

JR N0YQO

17. Re: [TACGPS:1769] Re: GPS on Bicycles

From: coldwell@cfaiota0.harvard.edu
Date: Thu, 6 Aug 1998 11:43:31 -0400
To: tacgps@tapr.org
Message-ID: <199808061543.LAA00637@cfaiota0.harvard.edu>
Rendered body type: text/plain

What you describe is very consistent with my experience. However,
given the way GPS works (i.e. finding the intersection of four spheres

centered on the satellites), it's not clear to me why one direction
should be less accurate than the other two. Is it because the
satellites are always above and never below the receiver?

--

Charles M. Coldwell
Harvard-Smithsonian Center for Astrophysics
60 Garden St. MS #20
Cambridge, MA 02138
(617) 495-7491

> -----Original Message-----
> From: coldwell@cfaiota0.harvard.edu <coldwell@cfaiota0.harvard.edu>
> To: tacgps@tapr.org <tacgps@tapr.org>
> Date: Tuesday, August 04, 1998 3:56 PM
> Subject: [TACGPS:1766] Re: GPS on Bicycles
>
> >
> >Just finished a bicycle ride two weeks ago from Tucson to Albuquerque
> >with my Magellan 2000XL. I didn't run it continuously, but used it to
> >get a fix every evening on the six day ride. I was actually pretty
> >disappointed with the altitude measurements, which seemed to be much
> >less accurate than the lat/long, and disagreed with topographical maps
> >and road signs by disturbing amounts. The ride went from a nadir of
> >2050 feet elevation to a summit of 7550, and the Magellan was
> >sometimes off by 500 feet or more and never held a consistent value.
> >As I am sure you are aware, bicyclists are very interested in accurate
> >measurements of altitude, perhaps even more than lat/long. I would be
> >interested to learn how your Garmin compares, although I suppose there
> >isn't much interesting topography around Muncie.
> >
> >--
> With GPS your LAT/LON is 95% within 100m (600ft diameter) radius of true
> position. Altitude is the least accurate of the GPS outputs and can be 200m
> (1200ft diameter) radius from true altitude! This will be seen in all GPS
> units. DGPS will significantly improves the result, but the altitude will
> always be the least accurate.
> 73's
> Doug
>
> >
> >Charles M. Coldwell
> >Harvard-Smithsonian Center for Astrophysics
> >60 Garden St. MS #20
> >Cambridge, MA 02138
> >(617) 495-7491
> >

18. TAC-32 without DCD 1PPS sigs?

From: Brooks Shera <ebs@lanl.gov>
Date: Thu, 6 Aug 1998 17:08:34 -0600
To: <tacgps@tapr.org>
Message-ID: <199808062305.RAA24675@newreg.lanl.gov>
Rendered body type: text/plain

Several people that are building the gps-discipled VCXO controller
described
in my July QST article have asked about a convenient way to setup and
monitor a Oncore gps receiver. I have been suggesting TAC-32 since it
has all the nifty features needed to setup position-hold mode
(position averaging, etc).

The controller board has spare MAX233 sections that can convert (and
invert)
the Oncore serial signals to true RS-232, so interfacing is is easy.

However, there aren't enough spare parts on the controller to also convert
the gps 1 PPS to true RS-232 for the DCD line. I believe most PC's
don't care if the DCD signal is TTL or RS-232, but just in case
I tried running TAC-32 without any DCD 1 PPS signal.

Without the DCD signal TAC-32 seems to work fine except that the display
only updates once every 4 seconds instead of once per second. Is this
normal or
am I doing something wrong?

I'm using TAC-32 vsn 1.2.7, which is the latest version I think.

I may have TAC-32 setup improperly since a few months ago Rick wrote
[TACGPS:1075]:
>
>The DCD 1PPS signal is only used to synchronize the PC time. The PC clock
>is managed in 1ms resolution for Windows NT and 95. However, the jitter
>is more like 20-50ms. ...

Any comments would be appreciated.

Brooks, W5OJM

19. Re: [TACGPS:1774] TAC-32 without DCD 1PPS sigs?

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Fri, 07 Aug 1998 04:02:12 +0000
To: tacgps@tapr.org
Message-ID: <35CA7C44.E409B19B@clark.net>
Rendered body type: text/plain

Brooks Shera wrote:
> [snip]
> However, there aren't enough spare parts on the controller to also convert
> the gps 1 PPS to true RS-232 for the DCD line. I believe most PC's
> don't care if the DCD signal is TTL or RS-232, but just in case
> I tried running TAC-32 without any DCD 1 PPS signal.
>
> Without the DCD signal TAC-32 seems to work fine except that the display
> only updates once every 4 seconds instead of once per second. Is this
> normal or
> am I doing something wrong?

TAC32 (and my predecessor program SHOWTIME) use the hardware generated
1PPS signal to "pace" the program. Rick made an attempt to make TAC32
run without needing a 1PPS signal, but its operation is compromised.

I'd offer several alternative bits of advice:

(1) >MOST< PC RS232 ports run with 0/+5v levels in lieu of "true
RS232". Try just connecting the 1PPS signal from the ONCORE directly
to the PC's DCD input. You can see a hint of this trick in my "emulate"
description at
  ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/emulate.zip

(2) If this fails, there is a simple "true RS232" level converter
that I first used in the "TAC-LITE" seen at
  ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/tac-lite.zip

I did a later version of this as a GPS-25 fake TAC which can be seen in
  ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/gps-25.pdf

In both these designs, an inverting PNP transistor is used as a
level converter, "stealing" some negative voltage from the RS232
interface. In the TAC-2, the "extra" RS232 TXD needed for the
Trimble SK-8 uses the same generic circuit, with the negative voltage
"stolen" from the -10v pin on the MAX232 chip.

Try (1) first -- it works in about 98% of the cases just fine.

73, Tom

20. RE: [TACGPS:1774] TAC-32 without DCD 1PPS sigs?

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Fri, 7 Aug 1998 00:53:25 -0400
To: <tacgps@tapr.org>
Message-ID: <000201bdc1bf$4fdade20$101161cf@rick.cnssys.com>
Rendered body type: text/plain

Brooks,

You are absolutely correct. This is an artifact of a fix that was intended
to make certain Garmin receivers work (e.g., the GPS-III). These receivers
operate in NMEA mode, have very long messages (> 1 sec) and no 1PPS .

Unfortunately I coded it wrong. Your symptom was the tip of a much larger
problem that has now been fixed properly. Thank you for the bug report.

Look for version 1.2.8 with this and other fixes as well as some exciting

new features within the next day or two. Registered users will receive their customary e-mail when it is ready.

Rick
WB2TNL

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Brooks Shera
Sent: Thursday, August 06, 1998 7:09 PM
To: tacgps@tapr.org
Subject: [TACGPS:1774] TAC-32 without DCD 1PPS sigs?

[snip]

Without the DCD signal TAC-32 seems to work fine except that the display only updates once every 4 seconds instead of once per second. Is this normal or am I doing something wrong?

I'm using TAC-32 vsn 1.2.7, which is the latest version I think.

[snip]

Any comments would be appreciated.

Brooks, W5OJM

21. Oncore VP: DOA?

From: Terje Mathisen <Terje.Mathisen@hda.hydro.com>
Date: Sat, 08 Aug 1998 00:10:02 +0200
To: tacgps@tapr.org
Message-ID: <35CB7B3A.4298@hda.hydro.com>
Rendered body type: text/plain

Last week I asked about the MCX to BNC patch cable, and Reg Clemens <reg@dwf.com> was kind enough to point me at http://www.lowe.co.uk, who shipped one off yesterday, at a cost of GBP 15, incl shipping.

In the meantime I managed to patch a cable together from parts I found here in Oslo, and attached the Oncore to the minimal VP Oncore Interface board (made by McKinney Technology, and ordered with the Oncore).

This was preassembled, except for the need to connect the power and RS232 cables/connectors, so there doesn't seem to be anything I could mess up.

I connected just three wires: G = Ground (DB9-5), T = TXB (DB9-2) and E = RXB (DB9-3), as per the enclosed instruction sheet.

I used a lab supply to deliver 8V DC to the power input, which is stated capable of handling anything from 7-30 VDC, and I measured +5V at the Oncore VP power connector (before actually attaching the GPS board).

However, after connecting the GPS board, GPS antenna, Laptop and and then turning on the lab power supply (in that order), I tried to connect to the GPS unit using both the Motorola SW and SHOWTIME.

I did this after booting into plain DOS to avoid any problems caused by Win98/WinNT.

Neither of them got any response out of the GPS board, so now I'd like to know how I can find out if the VP Oncore was DOA, or if something I've done can have caused this?

Is the RS232 connection correct, or should RXB/TXB be swapped?

Terje

--
- <Terje.Mathisen@hda.hydro.com>
Using self-discipline, see http://www.eiffel.com/discipline
"almost all programming can be viewed as an exercise in caching"

22. Re: [TACGPS:1777] Oncore VP: DOA?

From: "Steven R. Bible" <srbible@gate.net>
Date: Fri, 07 Aug 1998 18:43:51 -0400
To: tacgps@tapr.org

Cc: Terje.Mathisen@hda.hydro.com
Message-ID: <3.0.5.32.19980807184351.009a5da0@pop.gate.net>
Rendered body type: text/plain

At 05:10 PM 8/7/98 -0500, you wrote:

[snip]

>I connected just three wires: G = Ground (DB9-5), T = TXB (DB9-2) and E
>= RXB (DB9-3), as per the enclosed instruction sheet.

[snip]

>Is the RS232 connection correct, or should RXB/TXB be swapped?

Terje, The connections are correct, you do not have to swap them around.

Here are some things to check...

1. The PC Controller program should give you some indication that it has made contact to the Oncore VP. Oncores come from the factory in IDLE mode. You need to put it into NAVIGATE mode. You should be able to issue the following commands:

    mode f <-- places it into mode fixed
    ps8 1   <-- track 8 channel and output every 1 second

Then the PC Controller program should show some life.

2. Showtime should be able to initialize the Oncore as mentioned above. However, you did not mention connecting the 1PPS line to pin 1 of the DB9 connector. Showtime MUST has this connection or it will not work. Read in the instructions to see how to make this work.

3. You may download TAC32 for evaluation purposes (http://www.cnssys.com/tac32/) and see if it will initialize the Oncore VP. TAC32 is a MUCH improved version of Showtime. TAC32 can be used with and without the 1PPS signal.

4. After all the above, it can be a electrical problem. Do a careful visual inspection. I don't know if Doug included a schematic with the power board, but if you need one I have a sketch I can email you in PDF format.

Hope this helps,
 - Steve
 (n7hpr@tapr.org)

23. 1998 ARRL and TAPR Digital Communications Conference

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Sun, 9 Aug 1998 12:20:14 -0600
To: "TAPR-BB list mailing"<tapr-bb@tapr.org>
Cc: "HF SIG list mailing"<hfsig@tapr.org>, " Spread Spectrum "<ss@tapr.org>,
        " TAPR/AMSAT DSP "<dsp@tapr.org>,
        "APRS SIG list mailing"<aprssig@tapr.org>,
        "NETSIG list mailing"<netsig@tapr.org>,
        "BBS SIG list mailing"<bbssig@tapr.org>,
        " tacgps "<tacgps@tapr.org>, aprsnews@tapr.org, mic-e@tapr.org,
        TAPR Regional Freq <regional_freq@tapr.org>
Message-ID: <v04011707b1f39762e9cf@[168.191.230.109]>
Rendered body type: text/plain

1998 ARRL and TAPR Digital Communications Conference
September 25-27, 1998
Chicago, Illinois (minutes from O'Hare Airport)

Web: http://www.tapr.org/dcc

The 1998 ARRL and TAPR Digital Communications Conference will be held September 25-27, 1998, in Chicago, Illinois. This year's conference location is the Holiday Inn Rolling Meadows, just minutes from O'Hare Airport.

Not only is the Digital Communications Conference technically stimulating, it is a weekend of fun for all who have more than a casual interest in any of the ham digital communications modes. This includes APRS operators, digital networks, software writers, modem designers, and digital satellite

enthusiasts. The ARRL and TAPR Digital Communications Conference is for all levels of digital operators -- a must conference to attend to become active on a national level. Now, more than ever, amateur radio needs this great meeting of the minds because it is important that we demonstrate a continued need for the frequency allocations we have by pushing forward and documenting our achievements. The ARRL and TAPR Digital Communications Conference is one of the few ways to record our accomplishments and challenge each other to do more.

A Conference for the Beginner, Too

The conference is not just for the digital expert. This year's conference again provides multiple session tracks for beginning, intermediate, and advanced presentations on selected topics in digital communications. Topics will include APRS, satellite communications, TCP/IP, digital radio, Spread Spectrum, and many others. Come to the conference and hear these topics presented by the experts! Don't miss this opportunity to listen and talk to others in these areas.

Symposia and Seminars

In addition to the presentation of papers on Saturday, three symposia/seminars will be held. These sessions are provided to allow those with additional time and interest to make the most of the Digital Communications Conference. For those who may have interest in just one symposium or seminar, registration for the conference is not required to attend these activities. This allows maximum flexibility for those who may want to participate during the Digital Communications Conference, but do not have an entire weekend to devote to the event.

The Second APRS National Symposium will be held on Friday and will be moderated by Steve Dimse, K4HG (the developer of javAPRS). It will likely include many APRS software authors, such as Bob Bruninga, WB4APR (the father of APRS), Keith Sproul, WU2Z, Mark Sproul, KB2ICI (the developers of MacAPRS and WinAPRS), Brent Hildebrand, KH2Z (the developer of APRSPLUS), and other nationally-known APRS leaders. Join this group for the afternoon and evening for in-depth discussions and presentations on the current and future status of APRS. This is a unique opportunity to gain insight into this fast-growing digital aspect of amateur operations that combines computers, packet radio, and GPS (Global Positioning System).

Starting late Friday afternoon, a half-day seminar titled "Infrastructureless Technologies in Amateur Radio," presented by Don Lemke, WB9MJN, will cover the pros and cons of DDMA (directivity division multiple access, a proposed infrastructureless technique) versus hubbed (cellular style) and other infrastructure dependent techniques, the basic problem of megabaud rate communications into the ham QTH, and some techniques for channel-area acquisition including full duplex/asynchronous versus simplex/synchronous radio/acquisition concepts. This seminar will start late enough on Friday afternoon to allow those flying that day to attend the seminar.

The Sunday morning seminar will be a combination of two different talks that will make one excellent seminar. The first presentation, by Lyle Johnson, WA7GXD, will focus on the upcoming RUDAK digital communications system scheduled to fly on the AMSAT Phase 3D satellite in the near future. Lyle will discuss features, systems design, integration, and experiments. The goal of the presentation is to zero in on the communications capabilities of RUDAK, the performance to be expected from the 153k6 PSK system, the limitations and capacities of the DSP modems, user requirements for receiving RUDAK, requirements for transmitting to RUDAK, and how amateurs can work to make ground operations a reality once the satellite is in operation. Information on how to submit a proposal for experimental time on RUDAK will be presented. The second presentation will be by Tim Shepard, KD1KY, regarding "Packet Radio Networks with Millions or Billions of Stations." This talk will present concepts and materials that make you think about different possibilities of networking in the future. Both Lyle's and Tim's presentations focus on different aspects of future digital communications possibilities.

Third Annual ARRL and TAPR DCC Student Papers Award

The deadline for the third annual ARRL and TAPR Student papers is past,

please think about having students submit next year for the travel awards. TAPR and the ARRL especially welcome papers from full-time students to compete
for these student papers award. Two $500 travel awards may be given, one in each of the following categories: a) best technical/theory-oriented paper by a student, and b) best educational or community-oriented application paper by a student. The paper should relate directly to a wireless digital communication topic (see the guidelines for more information). Papers co-authored by educators or telecommunications professionals are also eligible for this award as long as a student is the first author. The deadline for receipt of finished student paper manuscript is June 20, 1999. Please note that this deadline is different from the general conference paper submission date. For full details and paper guidelines contact TAPR or browse to http://www.tapr.org/dcc.

Call for Conference Proceeding Papers

Anyone interested in digital communications is invited to submit a paper for publication in the Conference Proceedings. Presentation at the conference is not required for publication. The primary purpose of the conference is to communicate ideas and techniques regarding digital communications. Papers written in an informal style are welcome, as well as those written to academic standards. If you know of someone who is doing great things with digital communications, be sure to tell them about this! Papers are due by August 15, 1998, and should be submitted to Maty Weinberg, ARRL, 225 Main Street, Newington, CT 06111, or via e-mail to lweinberg@arrl.org. The paper submission guidelines are available on-line (http://www.tapr.org/dcc).

Local/International Co-Host

The 1998 ARRL and TAPR Digital Communications Conference will be co-hosted by Chicago Amateur Packet Radio Association (CAPRA). CAPRA is one of the oldest packet radio groups in the US. It focuses on education about amateur packet radio, coordination of joint efforts of hams interested in packet radio, and technical and equipment support for a sound packet network in the Chicago area. They have had high-speed packet networks operational since the mid-1980s. Visit the CAPRA Web site at http://www.imaxx.net/capra for more information.

PRUG (Packet Radio User Group of Japan) will be the first International co-host of the ARRL and TAPR Digital Communications Conference. The conference is proud to welcome PRUG as part of the conference. PRUG will be hosting an informal social Friday evening after the seminar and symposium are completed. Visit http://www.prug.or.jp for more information about the organization.

What can you expect during the 1998 ARRL and TAPR Digital Communications Conference?

* A full day of papers, breakout sessions, and selected topics on Saturday for the beginner to advanced amateur digital enthusiast.

* Three seminars/symposia
  Friday (1 PM)
  - Second Annual APRS National Symposium,
    moderated by Steve Dimse, K4HG

  Friday (3 PM)
  - Infrastructure Technologies in Amateur Radio
    conducted by Don Lemke, WB9MJN

  Sunday (8:30 AM)
  - RUDAK Future Operations and Experimentations
    by Lyle Johnson, WA7GXD
  - Packet Radio Networks with Millions or Billions of Stations
    by Tim Shepard, KD1KY

* Third Annual Student Paper Awards.

* TAPR Membership Meeting

* A banquet with special guest speaker Steve Roberts, N4RVE, of Nomadic

Research Labs. Creator of the Winnebiko and Behemoth high-tech recumbent bicycles. His current project is focused on Microship technology (http://www.microship.com/).

* SIGs (Special Interest Groups) get-togethers on Saturday, following the banquet

* Informal get-togethers throughout the weekend

* A facility that is perfect for this type of conference

* Informal engineering discussions/demonstration areas

* Motorola Museum located in the area.

* An event at which the most important new developments in amateur digital communications are announced

* Digital 'movers and shakers' from all over the world in attendance

---

Conclusion

If you have attended a Digital Communications Conference in the past, remember how much fun it was discussing the latest developments into the wee hours! If you have never been to a Digital Communications Conference, then make your plans now to attend and find out how much fun they can be.

There are few activities where your participation can be so much fun and so important! You will be able to get together with colleagues from all over the world and bring each other up to date on your latest work. Experience all this and more for an unforgettable weekend of ham radio and digital communications. Make your travel and lodging arrangements now. We hope to see you at the ARRL and TAPR Digital Communications Conference, September 25-27!

Full information on the conference and hotel information can be obtained by contacting Tucson Amateur Packet Radio, 8987-309 E. Tanque Verde Road #337, Tucson, AZ 85749-9399, phone 940-383-0000, fax 940-566-2544, e-mail tapr@tapr.org, browse www.tapr.org/dcc.

Sincerely,

Steve Ford, WB8IMY, ARRL Conference Co-Chair
Greg Jones, WD5IVD, TAPR Conference Co-Chair
Steve Stroh, N8GNJ, Conference Manager
Mark J. Thompson, WB9QZB, Local Host Liaison
Carl Bergstedt, K9VXW, Local Host Liaison

Note: If you need conference handouts or flyers for ham club meetings, contact TAPR to get what you need!

Hotel Information

Conference presentations, meetings, and seminars will be held at the Holiday Inn Rolling Meadows. Special DCC rooms rates are $85 per night. When making reservations with the hotel, be sure to indicate you are attending the ARRL and TAPR DCC in order to get the discount. It is highly recommended that you book your room prior to arriving. A block of 75 rooms is reserved until August 31, 1998. After the 75 rooms are booked, rooms will only be available in nearby hotels, so be sure to book your rooms early! The hotel provides transportation to and from O'Hare Airport. Please contact the hotel to arrange specific transportation needs.

Holiday Inn Rolling Meadows (conference hotel)
3405 Algonquin Rd
Rolling Meadows, IL 60008
Phone 847-259-5000, fax 847-259-0597

Tucson Amateur Packet Radio
8987-309 E Tanque Verde Rd #337 * Tucson, Az * 85749-9399
---
e-mail: tapr@tapr.org web: <http://www.tapr.org/>
ftp: ftp.tapr.org
phone: 940-383-0000 fax: 940-565-2544

---

24. RE: TAC32 Version 1.2.7 Released

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sun, 9 Aug 1998 13:41:57 -0400
To: <tacgps@tapr.org>, <gpsdev@tapr.org>
Message-ID: <000201bdc3bd$0197c200$101161cf@rick.cnssys.com>
Rendered body type: text/plain

Version 1.2.8 of the TAC32 software is now available at
http://www.cnssys.com/tac32/
Information on both TAC32 and the CNS Clock are available at
http://www.cnssys.com/

Version 1.2.8, Aug 9, 1998   RELEASE NOTES:

Features:

Implemented a new Manual GPS Receiver Commands dialog box under the Data
menu. This allows the expert user to send any command to the GPS receiver.
This is especially useful to activate and deactivate messages to support
custom applications.

Reference locations may now be saved in a user-specific data base with
user-defined names by using the Manual Reference Location dialog box. The
GPS receiver can be loaded with data from this data base or data base
entries may be added and removed without interfering with the operation of
the GPS receiver. Refer to Help or the program documentation for details and
cautions before using this new feature.

The position and size of all dialog boxes and view port screens are now
saved so they will appear the same the next time the program is run.

All log types can now be conditioned to record data every "n" seconds.

Updates:

Updated help files and documentation. The full documentation is now
available on the Web as an Adobe file. The documentation has had significant
structural and content updates so those who had the previous documentation
in either printed or electronic form should replace that documentation with
this new document.
Improved the handling of special case situations such as operation without a
one-pulse-per-second signal, loss of GPS receiver lock, and loss of critical
GPS receiver messages.

Added LMR-240 and LMR-400 coax types to the coax calculators.

Garmin receivers operating in NMEA mode now have the $PGRME message
activated for compatibility with other software programs.

Corrections:

Corrected a number of minor bugs in the logging functions including one that
cause a program crash under certain circumstances.

Corrected the parsing algorithm for the latitude and longitude fields in the
Manual Reference Position dialog box so that "E", "W", "N", and "S"
designators can now be used in lieu of "+" and "-".

Rick
WB2TNL

Richard M. Hambly
CNS Systems, Inc.
(410) 987-7835
http://www.cnssys.com/

---

25. Re: [TACGPS:1780] RE: TAC32 Version 1.2.7 Released

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Sun, 09 Aug 1998 21:27:45 +0000
To: tacgps@tapr.org
Message-ID: <35CE1451.945693F3@clark.net>
Rendered body type: text/plain

The subject for Rick's message says 1.2.7, but the correct number
is 1.2.8!

Rick Hambly wrote:
> Version 1.2.8 of the TAC32 software is now available at
> http://www.cnssys.com/tac32/
> Information on both TAC32 and the CNS Clock are available at
> http://www.cnssys.com/

FYI -- A mirror of the tac32s.exe W95/98/NT install file is also
available on my aleph totally.accurate.clock file server at

ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/tac32/tac32s.exe

73, Tom

26. Re: [TACGPS:1780] RE: TAC32 Version 1.2.7 Released

From: Brooks Shera <ebs@lanl.gov>
Date: Sun, 9 Aug 1998 18:38:56 -0600
To: <tacgps@tapr.org>
Message-ID: <199808100036.SAA04543@newreg.lanl.gov>
Rendered body type: text/plain

Rick has fixed TAC32 vsn 1.2.8 so that the Clock display is
updated every second, even without the DCD 1PPS pulse.

However, it now appears that without DCD the Position Averaging
feature only updates "occasionally." People without the
DCD pulse may wish to hang on to vsn 1.2.7 for awhile.

"The programmers life is not a easy one".

27. TAC32 Version 1.2.8 Release

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Sun, 9 Aug 1998 23:14:58 -0400
To: <tacgps@tapr.org>
Message-ID: <000501bdc40d$0e54cf60$101161cf@rick.cnssys.com>
Rendered body type: text/plain

This problem has been fixed. Anyone who downloaded 1.2.8 before 11:15 p.m.
9-Aug-98 should download a fresh copy.

Rick

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Brooks Shera
Sent: Sunday, August 09, 1998 8:47 PM
To: tacgps@tapr.org
Subject: [TACGPS:1782] RE: TAC32 Version 1.2.7 Released

Rick has fixed TAC32 vsn 1.2.8 so that the Clock display is
updated every second, even without the DCD 1PPS pulse.

However, it now appears that without DCD the Position Averaging
feature only updates "occasionally." People without the
DCD pulse may wish to hang on to vsn 1.2.7 for awhile.

"The programmers life is not a easy one".

28. Kalman Filters Online

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Mon, 10 Aug 1998 12:43:44 +0000
To: TACGPS <tacgps@tapr.org>
Message-ID: <35CEEB00.B5C81956@clark.net>
Rendered body type: text/plain

Some of our past discussions (especially on disciplining xtal &
Rb oscillators to GPS and on the averaging of positions from GPS
receivers) have included the topic of the use of adaptive data
filters.

The name Kalman has crept into these discussions at times -- a
Kalman filter makes use of the statistical properties of the signal
to adaptively modify the properties of the filter. Many of your
GPS receivers (like the Garmin handhelds) appear to use Kalman
filters to combine the pseudorange and rate data to produce their
moving map displays -- the displayed position contains both the
past history of positions combined with a prediction based on
which way (and how fast) you are moving. When you are moving
smoothly, the filter keeps up with you, but when your car stops,

the filter properties adapt to the change rapidly.

I've just stumbled onto an interesting web page at the Air Force
Flight Test Center at Edwards AFB which contains a tutorial on these
filters. It includes a JAVAized block diagram and an interactive
JAVA filter you can play with online. If you are interested in
learning more about these filters, surf over to this URL:

        http://www.tspi.elan.af.mil/kalman.html

73, Tom

29. C/A Code Java Page

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Wed, 12 Aug 1998 01:57:49 +0000
To: TACGPS <tacgps@tapr.org>
Message-ID: <35D0F69D.9B9B0090@clark.net>
Rendered body type: text/plain

In case you are interested in the underlying spreading codes used for the
1.023 Mb/s C/A
code, Norris Weimer at the Univ. of Alberta just sent me this message:

> Hi Tom -
> I submitted a posting to the sci.geo.satellite-nav newsgroup this morning
> that you may be interested in. It's a Java demo of the C/A Code.
> It is based on some Basic code that you posted a couple years ago.
> I give you credit on the web page
> <http://www.ualberta.ca/~norris/gps/CAdemo.html>
>
> Thanks -
>   - Norris

If anyone want to see the original GWBASIC code (circa 1993), let me know.

73, Tom

30. Re: [TACGPS:1785] C/A Code Java Page

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Wed, 12 Aug 1998 12:11:19 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980812121119.00844e60@appstate.campus.mci.net>
Rendered body type: text/plain

Tom,

Thanks for posting the C/A page as well as the Kalman filter site.
Interesting stuff.

73's
Don, W4DH

31. Remove from mailing list

From: "Jorge L. Alvarez" <jallen2@earthlink.net>
Date: Wed, 12 Aug 1998 09:21:36 -0700
To: tacgps@tapr.org
Message-ID: <35D1C10E.79E7BFBA@earthlink.net>
Rendered body type: text/plain

Please REMOVE my name and my addres from tha mailing list.
Thank

tacgps@tapr.org wrote:

>   TACGPS Digest 301
>
> Topics covered in this issue include:
>
>   1) C/A Code Java Page
>   by "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
>
> --
>
> Date: Wed, 12 Aug 1998 01:57:49 +0000
> From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
> To: TACGPS <tacgps@tapr.org>
> Subject: C/A Code Java Page
> Message-ID: <35D0F69D.9B9B0090@clark.net>

>
> In case you are interested in the underlying spreading codes used for the
> 1.023 Mb/s C/A
> code, Norris Weimer at the Univ. of Alberta just sent me this message:
>
> > Hi Tom -
> > I submitted a posting to the sci.geo.satellite-nav newsgroup this morning
> > that you may be interested in. It's a Java demo of the C/A Code.
> > It is based on some Basic code that you posted a couple years ago.
> > I give you credit on the web page
> > <http://www.ualberta.ca/~norris/gps/CAdemo.html>
> >
> > Thanks -
> >   - Norris
>
> If anyone want to see the original GWBASIC code (circa 1993), let me know.
>
> 73, Tom
>
> ------------------------------
>
> End of TACGPS Digest 301
> ************************
[Attachment: vcard.vcf; text/x-vcard; 336 bytes]

32. Re: [TACGPS:1778] Re: Oncore VP: DOA?

From: Terje Mathisen <Terje.Mathisen@hda.hydro.com>
Date: Sun, 16 Aug 1998 20:12:52 +0200
To: tacgps@tapr.org
Message-ID: <35D72124.755A@hda.hydro.com>
Rendered body type: text/plain

Steven R. Bible wrote:
> 2. Showtime should be able to initialize the Oncore as mentioned above.
> However, you did not mention connecting the 1PPS line to pin 1 of the DB9
> connector. Showtime MUST has this connection or it will not work. Read in
> the instructions to see how to make this work.

I did this tonight, but still no signals.

> 3. You may download TAC32 for evaluation purposes
> (http://www.cnssys.com/tac32/) and see if it will initialize the Oncore VP.
> TAC32 is a MUCH improved version of Showtime. TAC32 can be used with and
> without the 1PPS signal.

Ditto, I ftp'd the latest version tonight, but TAC32 just stated that no
GPS could be found.

> 4. After all the above, it can be a electrical problem. Do a careful
> visual inspection. I don't know if Doug included a schematic with the
> power board, but if you need one I have a sketch I can email you in PDF
> format.

It seems to be OK, visually, and the 10-pin connector had ground and
+5.0 V at the proper pins, at least that's what it looked like on both
my Fluke meters (a normal multimeter and the portable ScopeMeter).

Should I return both parts to TAPR, so you can verify if either/both of
them are broken?

Should the 1PPS signal start as soon as I power up the GPS, instead of
waiting for satellite lock?

If so, then I could connect 5.0V directly to the GPS, and use my scope
on the 1PPS line.

Terje la8nw

--
- <Terje.Mathisen@hda.hydro.com>
Using self-discipline, see http://www.eiffel.com/discipline
"almost all programming can be viewed as an exercise in caching"

33. Receivers and antennas?

From: "Warren R. Fugate" <wetech@bellatlantic.net>
Date: Mon, 17 Aug 1998 21:05:45 -0400
To: tacgps@tapr.org

Message-ID: <35D8D369.705CA987@bellatlantic.net>
Rendered body type: text/plain

I'm building Brooks Shera's controller to be used for both oscillator
steering and as a precision time reference (on Linux with xntp). Two
questions for the collective wisdom represented here:

1. Motorola recommends the Oncore UT+ for timing applications. In one
of their application notes, a reprint of a paper presented at the 1997
Frequency Control Symposium, they put a little substance behind that
recommendation by graphing the much improved out of band rejection of
the UT+ versus the Oncore VP. However, this comparison was to a B4
series VP, and I haven't been able to find out if anything changed with
respect to the current B8 model. It would make life simpler to have
NMEA support, which is only in the VP. Does anyone know if the UT+
still has a better front end, and whether it makes any practical
difference?

2. I want to place an antenna on my roof to feed this setup. I've read
several articles on problems due to multipath, which certainly seems
like a real probability in my typical urban environment. Will the
Lowe/Mighty mouse/Motorola active antennas work well and survive the
high temperatures and UV exposure? Does anyone have any experience to
show that the antennas which attenuate multipath are or are not
worthwhile in this type of application?

Thanks for any advice!
--
Warren R. Fugate W3WE
WE Technologies
wetech@bellatlantic.net

34. Re: [TACGPS:1789] Receivers and antennas?

From: JIM KORENZ <jfkorenz@goodyear.com>
Date: Tue, 18 Aug 1998 08:20:43 -0400
To: <tacgps@tapr.org>
Message-ID: <00566500003959346000002L562*@MHS>
Rendered body type: text/plain

Hi Warren,
 I have used the older "hockey puck" Motorola active antenna for about 3
years outside and it seems to be
holding up quite well. As an aside, the antenna picks up satellites when my car
is parked inside my garage !! As long
as you don't have aluminum-backed insulation, it seems to go through the
plywood and tar shingles.
 Jim Korenz N8PXW   (jfkorenz@goodyear.com)

tacgps@tapr.org on 08/17/98 09:34:39 PM
Please respond to tacgps@tapr.org @ INTERNET
To: tacgps@tapr.org @ INTERNET
cc:
Subject: [TACGPS:1789] Receivers and antennas?

I'm building Brooks Shera's controller to be used for both oscillator
steering and as a precision time reference (on Linux with xntp). Two
questions for the collective wisdom represented here:

1. Motorola recommends the Oncore UT+ for timing applications. In one
of their application notes, a reprint of a paper presented at the 1997
Frequency Control Symposium, they put a little substance behind that
recommendation by graphing the much improved out of band rejection of
the UT+ versus the Oncore VP. However, this comparison was to a B4
series VP, and I haven't been able to find out if anything changed with
respect to the current B8 model. It would make life simpler to have
NMEA support, which is only in the VP. Does anyone know if the UT+
still has a better front end, and whether it makes any practical
difference?

2. I want to place an antenna on my roof to feed this setup. I've read
several articles on problems due to multipath, which certainly seems
like a real probability in my typical urban environment. Will the
Lowe/Mighty mouse/Motorola active antennas work well and survive the
high temperatures and UV exposure? Does anyone have any experience to
show that the antennas which attenuate multipath are or are not
worthwhile in this type of application?

Thanks for any advice!
--
Warren R. Fugate W3WE
WE Technologies
wetech@bellatlantic.net

35. Differential GPS in NE Ohio ?

From: JIM KORENZ <jfkorenz@goodyear.com>
Date: Tue, 18 Aug 1998 08:28:58 -0400
To: <tacgps@tapr.org>
Message-ID: <00566500039596180000002L582*@MHS>
Rendered body type: text/plain

I have a Motorola Oncore VP and would like to run Differential GPS. Does
anyone in NE Ohio have a base or
reference station up and running ? Is anyone using APRS or packet to broadcast
to corrections ? I live in
Uniontown Ohio, about 1/2 way between Akron and Canton, 50 mi south of
Cleveland. Has anyone received
the USCG beacons and decoded them ? If so, what hardware did you use ? Any info
would be appreciated.
  Thanks, Jim Korenz N8PXW   (jfkorenz@goodyear.com)

36. Re: [TACGPS:1791] Differential GPS in NE Ohio ?

From: "Steven R. Bible" <srbible@gate.net>
Date: Tue, 18 Aug 1998 09:09:44 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980818090944.0079cb80@pop.gate.net>
Rendered body type: text/plain

If you own an Oncore VP, consider putting up your own DGPS reference
station. Take a look at

    http://www.tapr.org/gps/dgps/

- Steve N7HPR

At 07:31 AM 8/18/98 -0500, you wrote:
>   I have a Motorola Oncore VP and would like to run Differential GPS. Does
>anyone in NE Ohio have a base or
>reference station up and running ? Is anyone using APRS or packet to
broadcast
>to corrections ? I live in
>Uniontown Ohio, about 1/2 way between Akron and Canton, 50 mi south of
>Cleveland. Has anyone received
>the USCG beacons and decoded them ? If so, what hardware did you use ? Any
info
>would be appreciated.
> Thanks, Jim Korenz N8PXW   (jfkorenz@goodyear.com)
>
>

37. TAC32 forwarded help request

From: Brooks Shera <ebs@lanl.gov>
Date: Tue, 18 Aug 1998 15:36:55 -0600
To: <tacgps@tapr.org>
Message-ID: <199808182133.PAA05907@newreg.lanl.gov>
Rendered body type: text/plain

I am forwarding the message below for consideration by the TAC-32
experts. Any ideas about what's wrong?

Brooks

>
>   I am testing the tac32 with my Oncore UT but I have discovered that
>   elevation and azimut are not displayed on the screen and the sky map
>   of the sat.is empty.Another problem is that if the software recognize
>   the receiver
>   the configuration page is forbitten to the user and is impossible to
>   change the functions (example: timing or static application mode).
>   The work around is to disconnect the serial cable PC/RX ,start the tac
>   and ,after the rx failure message reconnect the cable.This way permit
>   the correct receiver mode selection.Some help?
>   My receiver is a model R221A1111 software version 1 rev.3 (Motorola)
>   sw date sept 1996 HWDR P/N 1 SERIAL R000MU MANUFACTUR DATE 6G25.

>
>   Luciano
>
>LUCIANO_PARAMITHIOTTI@HP-Italy-om4.om.hp.com

38. Re: [TACGPS:1793] TAC32 forwarded help request

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Wed, 19 Aug 1998 02:40:26 +0000
To: tacgps@tapr.org, LUCIANO_PARAMITHIOTTI@HP-Italy-om4.om.hp.com
Message-ID: <35DA3B1A.17A498BE@clark.net>
Rendered body type: text/plain

Brooks Shera wrote:
> I am forwarding the message below for consideration by the TAC-32
> experts. Any ideas about what's wrong?
>
> Brooks
> ---
> >
> >   I am testing the tac32 with my Oncore UT but I have discovered that
> >   elevation and azimut are not displayed on the screen and the sky map
> >   of the sat.is empty.Another problem is that if the software recognize
> >   the receiver
> >   the configuration page is forbitten to the user and is impossible to
> >   change the functions (example: timing or static application mode).
> >   The work around is to disconnect the serial cable PC/RX ,start the tac
> >   and ,after the rx failure message reconnect the cable.This way permit
> >   the correct receiver mode selection.Some help?
> >   My receiver is a model R221A1111 software version 1 rev.3 (Motorola)
> >   sw date sept 1996 HWDR P/N 1 SERIAL R000MU MANUFACTUR DATE 6G25.
> >
> >   Luciano
> >
> >LUCIANO_PARAMITHIOTTI@HP-Italy-om4.om.hp.com

Our real expert on the differences between the ONCOREs is Rick Hambly, and (I
think)
he has my old original UT board. But let me try to answer.

The current UT is called the UT+. The original UT receivers had a very limited
subset of the commands that are now supported (Luciano -- in English, I would
have probably made a sarcastic comment that, in my opinion, the original UT
was
pretty much Brain Dead!). So I think that the reason that your receiver does
not support these functions is that the functions were never enabled!

Also, for the UT be certain that you are trying to talk to it in Motorola
Binary. None of the UT or UT+ receivers support any NMEA modes/commands.

[Rick -- can you verify the firmware rev on the old prototype UT I loaned
you?]

73, Tom

39. Re: [TACGPS:1789] Receivers and antennas?

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Wed, 19 Aug 1998 04:05:01 +0000
To: tacgps@tapr.org
Message-ID: <35DA4EED.82A0573E@clark.net>
Rendered body type: text/plain

Warren R. Fugate wrote:
> [snip]
> 1. Motorola recommends the Oncore UT+ for timing applications. In one
> of their application notes, a reprint of a paper presented at the 1997
> Frequency Control Symposium, they put a little substance behind that
> recommendation by graphing the much improved out of band rejection of
> the UT+ versus the Oncore VP. However, this comparison was to a B4
> series VP, and I haven't been able to find out if anything changed with
> respect to the current B8 model. It would make life simpler to have
> NMEA support, which is only in the VP. Does anyone know if the UT+
> still has a better front end, and whether it makes any practical
> difference?

The newest ONCORE VP is supposed to have improved RF performance, and I
think it has incorporated the extra filter they put into the UT+. I've
tried it and don't see much difference in performance.

In preparation for WRC-99 (now redesignated WRC-00 assuming no Y2K glitches),
I built an RFI generator so we could evaluate the performance of some
spacecraft GPS rcvrs. If I have time, I'll make some quantitative
measurements on the older and newer VPs.

> 2. I want to place an antenna on my roof to feed this setup. I've read
> several articles on problems due to multipath, which certainly seems
> like a real probability in my typical urban environment. Will the
> Lowe/Mighty mouse/Motorola active antennas work well and survive the
> high temperatures and UV exposure? Does anyone have any experience to
> show that the antennas which attenuate multipath are or are not
> worthwhile in this type of application?

In my additional TAC/SHOWTIME notes and FAQs, I addressed the multipath
question, along with other systematic error sources. The bottom line is that
multipath is in general less than a few nsec. It may effect the ultimate
accuracy at levels comparable to residual SA effects. With Brooks' controller,
the averaging times are long enough so that I'd be surprised if you could
detect it.

With TAC32 (or my old SHOWTIME code) you have a pretty good multipath
diagnostic tool already in the "S-Meter" bars. If a signal is arriving by two
different paths for a given satellite, then it will show up as quasi-
sinusoidal time variations in carrier phase, in timing and in signal
strength. The periodicity of these variations depends on how much path
is added and how fast the geometry changes, and the amplitude is a function
of how strong the undesired signal is. For most cases, the "beat" will have
periods from a few seconds to a few minutes. If the S/N display is stable
at the 1-2 dB level (25-50% power changes, corresponding to ~10-25% voltage
changes), then multipath is not a problem.

In all my timing notes (and included in the default "best timing" settings
in SHOWTIME & TAC32), I recommend that the ONCORE receivers be operated in the
"Highest in Sky" satellite selection mode for best performance. The reason for
this recommendation is that several of the systematic timing errors are more
serious at low elevation angles. These effects include:
   (a) Multipath arising from ground reflections and objects below the antenna
   (b) Tropospheric delay errors
   (c) Ionospheric delay errors

My advice -- use the software defaults, and select an elevation mask that
"hides" any metallic obstructions. And get the antenna into the clear as
much as possible. If you have to accept some blockage, put the antenna so that
the obstruction is +/- 30 degrees from north (for mid-latitude locations
in the northern hemisphere) since there are no satellites in that part of
the sky (due to the 55 degree inclination for the GPS satellite orbits).

{Aside -- Yes, TDOP improves a bit when you include more satellites at low
 elevations. You can use the TDOP selection criteria with the ONCORE instead
 of "highest in sky" to get a marginally better TDOP satellite geometry.
 But all my testing shows that the marginal improvement isn't worth it.
 The systematic errors are larger than the geometric improvement.}

Regarding the durability of antennas. Most of the 50+ TACs we have deployed
around the world were supplied with the Trimble white "hockey puck" antenna
(about 2.5" in diameter). People were advised to use the mag mount on a metal
plate at least a half-wavelength (10 cm = 4") in radius. Most people didn't
trust the magnets, so they used some supplementary screws (the Trimble had
some 4-40 tapped holes). Our experience was that the "hockey puck" worked
better than the Motorola "mushroom" antenna (about 4" in diameter & 2" tall).
Lately we are supplying the same small Motorola Antenna 97 offered by TAPR
(squarish in shape, about 1.5" on a side and 1" tall) -- see it on the TAPR
web site at
            http://www.tapr.org/gps/index.html
   and at   http://www.tapr.org/gps/ant97.html
This antenna seems to work quite well, especially on a ground plane at least
4" in radius. It lacks the mounting holes we had with the Trimble antenna, so
I'd suggest the use of some RTV adhesive in a permanent installation.

Hope this helped -- 73, Tom

40. Re: [TACGPS:1791] Differential GPS in NE Ohio ?

From: Mike Young <myoung@neo.lrun.com>
Date: Wed, 19 Aug 1998 01:01:45 -0400
To: tacgps@tapr.org
Message-ID: <199808190501.AAA18671@tapr.org>
Rendered body type: text/plain

At 08:31 AM 8/18/98 , you wrote:
>   I have a Motorola Oncore VP and would like to run Differential GPS. Does
>anyone in NE Ohio have a base or
>reference station up and running ? Is anyone using APRS or packet to
broadcast
>to corrections ? I live in
>Uniontown Ohio, about 1/2 way between Akron and Canton, 50 mi south of
>Cleveland. Has anyone received
>the USCG beacons and decoded them ? If so, what hardware did you use ? Any
info
>would be appreciated.
> Thanks, Jim Korenz N8PXW   (jfkorenz@goodyear.com)
>
Jim, Doug Bade, KB8GVQ was transmitting a DGPS signal from (I assume) one
of his digi's just before the
Dayton Hamfest. APRSdos will display a short message in the upper right
corner when it detects a DGPS
signal. I no longer see it and don't know if he lost interest, is busy or
moved that service to 440 somewhere.

Mike, WB8CXO

41. Re: Receivers and antennas?

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Fri, 21 Aug 1998 03:04:30 +0000
To: "Warren R. Fugate" <wetech@bellatlantic.net>
Cc: TACGPS <tacgps@tapr.org>
Message-ID: <35DCE3BE.7E92BEB6@clark.net>
Rendered body type: text/plain

In a note sent to me privately, Warren Fugate wrote:

> [snip]
> The "Oncore User's Guide" (revised June 1998) which Motorola just
> Emailed to me specifically compares the UT+ to the B8 series VP Oncore
> on pages 3.11 & 3.12. On the other hand, their chart of available
> models shows a "HI RF" capability as a new VP Oncore feature. I'm still
> working on getting a definitive answer.

It's my understanding that the newest ONCOREs are the "high RF" type.
The following words are snipped from the material on the Synergy site at
    http://www.synergy-gps.com/vponcore.html

> .... Enhanced versions of the VP ONCORE with model numbers
> beginning with "B8" began shipping in December 1997. Enhancements include
> improved performance in EMI environments and an integrity monitor incorporated
> into the position filter.

However, in trying upwards of 100 of various ilks of PVT-6's and ONCOREs since
1992, I have NEVER seen any get hit by RFI.

Much of the current concern about RFI stems from the automotive market. The
newest PCS/GSM cell fones are running at ~1900 MHz, and some cars are starting
to be equipped with antennas to support integrated GPS=1575 MHz + PCS/GSM.

In normal environments, I really wouldn't concern myself with the RFI issues.

> [snip]
> BTW, the FAQ states: "Motorola does not state if they make any attempt
> to correct for tropospheric delay in their documentation so I must
> presume that they do not." According to the above mentioned User's
> Guide, the @@Aq command now allows ionospheric, tropospheric, or both
> corrections. Unfortunately, there is no mention of what they do.

In EVERY document I have seen, @@Aq is a 2 position switch that turns the
Ionosphere correction on/off. To my knowledge, none of the ONCOREs include
any kind of a troposphere model. The ionosphere model is pretty simple,
based on a single scaling parameter based on solar activity. This crude
estimate of Total Electron Content is updated by the USAF controllers
at the same time the upload new ephemerides (a few times/day) and is
included in the 1500 bit broadcast message (sent at 50 b/s, i.e. once every 30
sec) by each GPS satellite. The @@Aq switch simply turns the correction based
on this parameter on/off. If Motorola has changed the definition of @@Aq,
it doesn't show in any documentation that I have (and I just verified this
statement with my copy of the ONCORE User's Guide dated May 1996 which sez
"The correction does a reasonable job of taking out the range error induced
 by the earth's ionosphere by using an algorithm and parameters transmitted

to the users by the satellites".)

- -

Just for scaling purposes, here are some Rough Order of Magnitude (ROM) estimates and some comments on atmospheric effects:

Directly overhead, the "dry" component of the troposphere adds ~2 meters to the Zenith Path Delay (ZPD); this is due to the oxygen and nytrogen molecules
in the atmosphere. The ZPD is directly proportional to the atmospheric pressure.
At sea level, 1 Atmosphere = 1000 mbar = ~2 meters, so the ZPD changes by ~2 mm/mbar. The atmosphere is a spherical shell, but if you make a simplifying assumption of a plane-parallel atmosphere, then the delay as you get to horizon is approximately ZPD * secant(zenith angle) = ZPD * cosecant(elevation).
Plugging in the numbers, the effect is then ~4 meters for a satellite at 30 degrees elevation or ~6 meters at 20 degrees.

In addition, water vapor in the atmosphere adds a very variable ZPD ranging from zero (at 60 below at my Fairbanks site or atop Mauna Kea) to about 50 cm (in Miami or the Virgin Islands on a wet afternoon). The "wet" path delay can easily change by a factor of 2 in an hour when a local weather front comes streaming thru.

In fact, many of the "professional" dual-frequency geodetic facilities now use these two factoids to provide an operational water-vapor monitor function. Local meteorology measurements (especially of pressure) measure the "dry" component and the GPS data is fit to extract the "wet" part. This has proven to be of great use in forecasting severe storms, especially in the TX/OK/KS "tornado alley" region.

Now to the ionosphere. At ~2.3 GHz, the typical ionopheric ZPD is also ~2 meters, but the magnitude of the delay scales as the square of the wavelength. This means that the ionosphere ZPD at GPS L1 is ~5 meters, varying with solar activity, time of day and latitude. Since most of the ionosphere is at ~300 km height, we never look thru an angle greater than ~45 degrees even at the horizon, so the path thru the ionosphere at low elevations is never more than ~ sqrt(2) more than it is in the zenith, i.e. it is rarely bigger than ~10 meters. The correction transmitted in the GPS message (and enabled with @@Aq) uses a very simplified model of reality, but it reduces the "as big as 10 meters" to "doesn't hurt the data more than ~5 meters" when it is turned on.

In the FAQs on aleph, I discuss how these effects map into timing errors. But since we are talking about a couple of effects that are at the ~5 meter levels, they can't effect the timing at levels bigger than ~15-20 nsec. And the same comment applies to simply ignoring multipath. The bottom line is that GPS timing with rcvrs like the ONCOREs can be trusted at the ~20-30 nsec level even when they are ignored! And hopefully, all the examples I have posted prove that these claims are actually realized in the "real world".

42. Re: [TACGPS:1797] TACGPS digest 307

From: "Warren R. Fugate" <wetech@bellatlantic.net>
Date: Sun, 23 Aug 1998 10:09:48 -0400
To: tacgps@tapr.org
Message-ID: <35E022AC.E541405B@bellatlantic.net>
Rendered body type: text/plain

Dr Thomas A Clark (W3IWI) wrote:

> It's my understanding that the newest ONCOREs are the "high RF" type.
> The following words are snipped from the material on the Synergy site at
>   http://www.synergy-gps.com/vponcore.html
>
> > .... Enhanced versions of the VP ONCORE? with model numbers
> > beginning with "B8" began shipping in December 1997. Enhancements include
> > improved performance in EMI environments and an integrity monitor incorporated
> > into the position filter.

According to a note just received from Art Sepin of Synergy:

> The "HI RF" designation fo the VP ONCORE "B8" part numbers
> was intended to describe the EMI characteristics of these newer units
> compared with previous versions of the VP ONCORE; Specifically B3 and
> B1 units. The triple filtered UT+ RF front end is actually better

than the VP/B8. Chapter 3 of the GT+/UT+ TRM includes a discussion
with details (fig. 3.6).

So it would appear that the UT+ is still different.

> However, in trying upwards of 100 of various ilks of PVT-6's and ONCOREs since
> 1992, I have NEVER seen any get hit by RFI.
>
> Much of the current concern about RFI stems from the automotive market. The
> newest PCS/GSM cell fones are running at ~1900 MHz, and some cars are starting
> to be equipped with antennas to support integrated GPS=1575 MHz + PCS/GSM.
>
> In normal environments, I really wouldn't concern myself with the RFI issues.

>From the advertising, it would appear the the UT+ is aimed at
environments on the other end of the automotive phone market: timing
receivers collocated on cell transmitting towers. It's encouraging to
hear that more "normal" environments aren't likely to experience any
difficulties.

[snip]
> In EVERY document I have seen, @@Aq is a 2 position switch that turns the
> Ionosphere correction on/off. To my knowledge, none of the ONCOREs include
> any kind of a troposphere model. The ionosphere model is pretty simple,
> based on a single scaling parameter based on solar activity. This crude
> estimate of Total Electron Content is updated by the USAF controllers
> at the same time the upload new ephemerides (a few times/day) and is
> included in the 1500 bit broadcast message (sent at 50 b/s, i.e. once every 30
> sec) by each GPS satellite. The @@Aq switch simply turns the correction based
> on this parameter on/off. If Motorola has changed the definition of @@Aq,
> it doesn't show in any documentation that I have (and I just verified this
> statement with my copy of the ONCORE User's Guide dated May 1996 which sez
> "The correction does a reasonable job of taking out the range error induced
> by the earth's ionosphere by using an algorithm and parameters transmitted
> to the users by the satellites".)

Perhaps that's a recent change or another difference between the VP
ONCORE and the UT+/GT+. To quote from TRM0003 "ONCORE User's Guide"
(which only applies to the UT+/GT+), revision 3.2 June 1998:

        The user has the flexibility of turning the GPS ionospheric and/or
        tropospheric correction models on or off. The models do a reasonable
        job of taking out the range errors induced by the earth's ionosphere
        and troposphere by using algorithms and parameters transmitted to the
        users by the satellites.
        ...
        Default modes: Ionospheric model enabled
                        Tropospheric model disabled

The parameter to the @@Aq command is shown as:

        0 = both models disabled
        1 = ionospheric model only enabled
        2 = tropospheric model only enabled
        3 = both models enabled

> Just for scaling purposes, here are some Rough Order of Magnitude (ROM)
[snip]

Thanks for yet another clear and informative posting.
--
Warren R. Fugate
WE Technologies
wetech@bellatlantic.net

43. Re: [TACGPS:1797] Re: Receivers and antennas?

From: JIM KORENZ <jfkorenz@goodyear.com>
Date: Mon, 24 Aug 1998 08:31:48 -0400
To: <tacgps@tapr.org>
Message-ID: <00566500040924630000002L532*@MHS>
Rendered body type: text/plain

> [snip]
> The "Oncore User's Guide" (revised June 1998) which Motorola just
> Emailed to me specifically compares the UT+ to the B8 series VP Oncore
> on pages 3.11 & 3.12. On the other hand, their chart of available
> models shows a "HI RF" capability as a new VP Oncore feature. I'm still
> working on getting a definitive answer.

> It's my understanding that the newest ONCOREs are the "high RF" type.
> The following words are snipped from the material on the Synergy site at
>   http://www.synergy-gps.com/vponcore.html

> .... Enhanced versions of the VP ONCORE? with model numbers
> beginning with "B8" began shipping in December 1997. Enhancements include
> improved performance in EMI environments and an integrity monitor
incorporated
> into the position filter.

> However, in trying upwards of 100 of various ilks of PVT-6's and ONCOREs since
> 1992, I have NEVER seen any get hit by RFI.

> Much of the current concern about RFI stems from the automotive market. The
> newest PCS/GSM cell fones are running at ~1900 MHz, and some cars are starting
> to be equipped with antennas to support integrated GPS=1575 MHz + PCS/GSM.

> In normal environments, I really wouldn't concern myself with the RFI issues.

 I thought that I would add a few comments. I have been using a Motorola
PVT-6 in my car for about 3
years and have observed the following. I have no problems in using an HT inside
the vehicle, transmitting 3-5 Watts.
When I use the external antenna, a Larsen dual band glass mount on the rear
window, with my mobile radio at 25 watts
on 2M or 440 MHz, I lose "lock" on the GPS receiver for 25-30 sec, the same
amount of time it takes when
passing under a bridge. I am using the older Motorola active antenna (hockey
puck or mushroom), placed in the
center of the roof. It is about 2-3 feet from the dual band antenna. This may
not be a realistic expectation for the
RFI immunity of the GPS, but it is certainly a common situation, at least for
hams. On the positive side, I have
never "blown up" any of the Motorola units due transmitted RF (at levels up to
50W on 2 M or 440 MHz) .

  Jim Korenz (N8PXW) jfkorenz@goodyear.com

44. Re: Efratom connections

From: Doug Bade <doug@clecom.com>
Date: Mon, 24 Aug 1998 11:52:54 -0400
To: tacgps@tapr.org
Message-ID: <3.0.32.19980824115228.00690734@wingate>
Rendered body type: text/plain

Could someone foreward the resuting discussion summary of values to be
used with M100 Rb standard and the QST GPS locked oscillator board. I have
board and M100, ready to complete... TNX in advance... Doug KB8GVQ

PS.. any notes anyone has gathered from their results would be appreciated..
TNX. Doug.

45. RE: [TACGPS:1793] TAC32 forwarded help request

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Tue, 25 Aug 1998 11:26:47 -0400
To: <LUCIANO_PARAMITHIOTTI@HP-Italy-om4.om.hp.com>, <tacgps@tapr.org>
Message-ID: <000301bdd03c$c63948a0$101161cf@rick.cnssys.com>
Rendered body type: text/plain

Luciano,

Just a quick note from the author of TAC32 to let you know that I am looking
into this. Unfortunately the only UT 1.3 receiver I have here is not
working. I am trying to get another one so I can complete the tests.   I
suspect a problem with TAC32. I will let you know.

Rick
WB2TNL

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Brooks Shera
Sent: Tuesday, August 18, 1998 5:34 PM
To: tacgps@tapr.org
Subject: [TACGPS:1793] TAC32 forwarded help request

I am forwarding the message below for consideration by the TAC-32

experts. Any ideas about what's wrong?

Brooks

>
>   I am testing the tac32 with my Oncore UT but I have discovered that
>   elevation and azimut are not displayed on the screen and the sky map
>   of the sat.is empty.Another problem is that if the software recognize
>   the receiver
>   the configuration page is forbitten to the user and is impossible to
>   change the functions (example: timing or static application mode).
>   The work around is to disconnect the serial cable PC/RX ,start the tac
>   and ,after the rx failure message reconnect the cable.This way permit
>   the correct receiver mode selection.Some help?
>   My receiver is a model R221A1111 software version 1 rev.3 (Motorola)
>   sw date sept 1996 HWDR P/N 1 SERIAL R000MU MANUFACTUR DATE 6G25.
>
>   Luciano
>
>LUCIANO_PARAMITHIOTTI@HP-Italy-om4.om.hp.com

46. Motorola Antennas (again)

From: "Henk Uijterwaal (RIPE-NCC)" <henk@ripe.net>
Date: Wed, 26 Aug 1998 20:53:27 +0200 (MET DST)
To: TAPR TAC GPS Mailing List <tacgps@tapr.org>
Message-ID: <Pine.SUN.3.95.980826202606.21544A-100000@ncc.ripe.net>
Rendered body type: text/plain

Hi all,

Over the last months, we installed TAC's with Motorola Oncore's and
"hockey puck" antennas at several sites. At 3 sites, the antenna cable
had to be extended to something like 20..40m or 60..120 feet. At those
sites, the receiver doesn't seem to be able to find any satellites.
However, wehen the unit was returned and tested with only a few meteres of
cable between TAC and antenna, it worked fine.

I experimented a bit more and found that the combination Oncore plus
hockey puck antenna works fine with +/- 18m of RG58 cable between them
(work fine meaning that the receiver sees and locks on >3 satellites and
can do a 2 D fix), with 24m it strongly starts to depend on the location
of the antenna and with 30m of cable, the unit still sees satellites but
doesn't want to lock on them, either because the S/R ratio gets too low or
because there is too much loss in the cable.

This is a bit of a set-back, in particular since I was under the
impression that long cables with the Oncore weren't a problem.   So,

1. From this list, I got the impression that people had run 100..150
   feet of cable between antenna and receiver (=30..50 meters). Is
   this correct or did I mix up units here?

2. Does anybody have any experience with the new antenna, in particular
   the maximum cable length?

3. Does anybody know of other antennas that work with the Oncore and
   can be used with long cables.

4. The new antenna docs mentions RG-174 coax instead of RG-58. Would
   it help to use this kind of cable with the old antenna? From
   what I've seen, it appears that they're both 50 Ohm cables, but the
   losses in RG174 are a bit lower.

5. Is there any way I can adjust the S/R level where the Oncore
   locks on a satellite in software? (or something like that).

Any other suggestions? Thanks for your help,

Henk

Henk Uijterwaal   Email: henk.uijterwaal@ripe.net
RIPE Network Coordination Centre   WWW: http://www.ripe.net/home/henk
Singel 258   Phone: +31.20.535-4414, Fax -4445
1016 AB Amsterdam   Home: +31.20.4195305
The Netherlands   Pager: +31.6.57626855

%DCL-E-NOCFFE, unable to locate coffee - keyboard input suspended.

47. RE: [TACGPS:1802] Motorola Antennas (again)

From: Mastenbrook Gary-G13216 <g13216@email1.wes.mot.com>
Date: Wed, 26 Aug 1998 15:09:04 -0500
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <51F347B016ADD011963200805FC1456202C0B486@email1.wes.mot.com>
Rendered body type: text/plain

Henk- Hope you already have answers to your questions, but if not, here's my two cents...

1. Cable length (max). There is not really a maximum cable length specified for the receiver/antenna system. Instead, the loss of the cable (max) needs to be kept to the point where the S/N at the receiver is still above the minimum tracking threshold. I don't have the exact numbers for the maximum loss (given a patch antenna with built-in preamp and filter), but suspect that it is around 15-20 dB loss maximum. I've used long runs of cable between the antenna and the receiver, but usually use a combination of cable types. Cables used include: 20 feet of RG-58 (a short run in the laboratory), 100 feet or more of Andrews LDF-4-50 (1/2 inch hardline) running up to the roof area, and 20 feet of RG-174 (leading to the antenna). If you guess at the loss for the cable system it might be something like: RG-58; 5 dB, LDF-4-50; 4 dB, RG-174; 5 dB. Add it up and you get 14 dB or so. This works fine for the 8-10 systems like this that have been put into our laboratory area. (Please contact me directly for exact details if desired.)

2. I've deployed 4 or so systems which use the new antenna. I typically mount it on a ground plane (usually some HVAC ducting already present on the roof of the building) and find it works just as well as the larger/older style. From within the lab area, they are identical in performance such that the user's do not notice the difference.

3. Most outdoor survivable antennas will work provided they have an active pre-amp and some minimal level of filtering. I've used some of the Japanese Marine-type antennas with success at home for short term use only. (Had doubts about long term stability of materials used, so switched back to the 'puck'.) If you're trying to put up an antenna at a communications site (cellular or broadcast), you might wish to measure the level of non-GPS signals coming through before finalizing the design. May need to check for common mode RF as well... Some antennas offer better out-of-band rejection than others. (Sorry, no further info. available from me. Maybe others have this info?)

4. Be sure to use a coaxial cable rated for appropriate environmental exposure. If deploying a fixed system, you will not be too happy if you need to replace the outside cables every year if their outer coating cracks and develops intrusion points for moisture, so use the best cables available. I do not believe that the smaller coax (RG-174) has superior loss numbers compared to good RG-58 type cables, and thus recommend the larger cable be used. The GPS mobile installation market wishes to use the least expensive and smallest cable possible, and that has driven the antenna market to RG-174 and other small types of cable. It's not a real problem if the antenna comes with RG-174 feeder cable, just use it in conjunction with better cables for the remainder of the run, or cut it short and replace the rest of the length with decent low loss cable. (Depending on connectors used at the TAC, that RF connector cut off from the antenna might come in handy--given the ability to put connectors on RG-174 cable.)

5. S/R threshold setting. I'm not aware of any option to force a Motorola receiver to stop trying to track a satellite above its lowest elevation threshold setting. Most of the Motorola receivers are used in 'highest in sky' mode and automatically pick the best sats to use if they're above the minimum elevation. I believe if you fix your cable attenuation issue, the need for S/R threshold setting will disappear.

Closing thoughts: For best performance, use the best cable available within your budget. I use the combination specified in #1 above with great success and have no issues with poor fixes or bad S/N at any time here in the Chicago USA area. With the antennas 'stuck' on the HVAC ducting, I do not bother with screwing them down (just use magnet mount functionality), but am careful to route all cables such that excessive snowfall or tromping maintenance personnel will not disturb the antennas or stress the cables. Safety first!

Good luck & please feel free to ask more questions if these comments are not clear.

73's

Gary N8DMT
Motorola Telematics
Chicago, Illinois USA

> -----Original Message-----
> From: Henk Uijterwaal (RIPE-NCC) [SMTP:henk@ripe.net]
> Sent: Wednesday, August 26, 1998 1:55 PM
> To: tacgps@tapr.org
> Subject: [TACGPS:1802] Motorola Antennas (again)
>
> Hi all,
>
> Over the last months, we installed TAC's with Motorola Oncore's and
> "hockey puck" antennas at several sites. At 3 sites, the antenna
> cable
> had to be extended to something like 20..40m or 60..120 feet. At
> those
> sites, the receiver doesn't seem to be able to find any satellites.
> However, wehen the unit was returned and tested with only a few
> meteres of
> cable between TAC and antenna, it worked fine.
>
> I experimented a bit more and found that the combination Oncore plus
> hockey puck antenna works fine with +/- 18m of RG58 cable between them
> (work fine meaning that the receiver sees and locks on >3 satellites
> and
> can do a 2 D fix), with 24m it strongly starts to depend on the
> location
> of the antenna and with 30m of cable, the unit still sees satellites
> but
> doesn't want to lock on them, either because the S/R ratio gets too
> low or
> because there is too much loss in the cable.
>
> This is a bit of a set-back, in particular since I was under the
> impression that long cables with the Oncore weren't a problem.   So,
>
> 1. From this list, I got the impression that people had run 100..150
>   feet of cable between antenna and receiver (=30..50 meters). Is
>   this correct or did I mix up units here?
>
> 2. Does anybody have any experience with the new antenna, in
> particular
>   the maximum cable length?
>
> 3. Does anybody know of other antennas that work with the Oncore and
>   can be used with long cables.
>
> 4. The new antenna docs mentions RG-174 coax instead of RG-58. Would
>   it help to use this kind of cable with the old antenna? From
>   what I've seen, it appears that they're both 50 Ohm cables, but the
>   losses in RG174 are a bit lower.
>
> 5. Is there any way I can adjust the S/R level where the Oncore
>   locks on a satellite in software? (or something like that).
>
>
> Any other suggestions? Thanks for your help,
>
> Henk
>
> --
> --------
> Henk Uijterwaal   Email: henk.uijterwaal@ripe.net
> RIPE Network Coordination Centre   WWW:
> http://www.ripe.net/home/henk
> Singel 258   Phone: +31.20.535-4414, Fax -4445
> 1016 AB Amsterdam   Home: +31.20.4195305
> The Netherlands   Pager: +31.6.57626855
> --
> --------
>
> %DCL-E-NOCFFE, unable to locate coffee - keyboard input suspended.
>

48. Re: [TACGPS:1802] Motorola Antennas (again)

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Wed, 26 Aug 1998 16:55:12 -0400
To: tacgps@tapr.org, henk@ripe.net
Message-ID: <35E47630.541476F4@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Henk Uijterwaal (RIPE-NCC) wrote:
>
> Hi all,
>
> Over the last months, we installed TAC's with Motorola Oncore's and
> "hockey puck" antennas at several sites. At 3 sites, the antenna cable
> had to be extended to something like 20..40m or 60..120 feet. At those
> sites, the receiver doesn't seem to be able to find any satellites.
> However, wehen the unit was returned and tested with only a few meteres of
> cable between TAC and antenna, it worked fine.

Henk -- there are several brands of "hocky puck" antennas. When I've used
that term in the past it referred to the Trimble antenna and it was
white in color, looking literally like a hockey puck. But let me launch
into a tutorial on antennas and cables:

The basic problem is that the coax cable has loss. The antenna has a
preamplifier that has some gain. In general, the preamp gain must be
bigger than the coax cable loss. And you must be certain that the DC
voltage to operate the preamp is in fact getting thru the cable.

To fix the problem (assuming that the bias voltage is present), you have
to do one of the following:

1. Increase the preamp gain
    a. Add an extra preamplifier at the antenna end of the cable
    or b. Use a different antenna that is equipped with a better preamp

or 2. Lower the loss in the cable
    a. Make it be shorter
    or b. Use lower loss cable

Of these 2a or 2b is usually the most feasible.

For most of the GPS antennas, the preamp gain is 25-30 dB. Therefore you
need to keep the coax loss < 20-25 dB. You didn't specify the cable you
are using, but here are the losses associated with several types of
cables. The units are in dB/100 feet (pardon the archaic English units!)
at a frequency of 1.0 GHz. GPS is at 1.575 GHz, so the losses will be
WORSE at GPS. As a rule of thumb, I'd guess that the losses will be
something like

(GPS 1.6 GHz loss in dB/100 ft) = 1.3 * (1 GHz loss vales)

and since 1 meter = 3.28 feet:

(Loss per meter) = 0.0328 * (loss per 100 feet)

Or combining these two:

(Loss at GPS per meter) = (Loss at 1 GHz per 100 feet)/24

Approximate Losses @ 1 GHz:

9913 and some other air insulated ~11 mm diameter cables	= 4.5 dB/100'
~ 10 mm diameter RG8 or RG214	= 8.4
~ 7mm RG6 75 ohm foam cable used for K-band TV satellites	= 10
~ 8 mm diameter foam dielectric RG8X or "Mini-8" cable	= 13
~ 6 mm RG58 cables	= 24
~ 3 mm RG174 cable	= 30

Note that in general, the bigger the cable, the lower the loss. Also note
that cables with air or foam dielectric have lower loss than those with
solid plastic. I gather you have only considered the two worst cables
in this list so far.

Since its losses are low and since it is easily available here in the
USA (and I presume in NL), I'd suggest you experiment with the 75 ohm
"RG6" foam cable. Here we can but it at our local Radio Shack or Best
Buy store to connect the 50 cm diameter K-band TV satellite dishes to
their electronics. The IF that is fed down the cable on these systems
is in the 900-1400 MHz range, so the cable is designed for good

performance around the GPS frequency. Some purists will criticise me
for suggesting the use of 75 ohm cable in a 50 ohm system. But believe
me, the added losses associated with a 1.5:1 VSWR due to the impedance
mismatch are trivial compared with the losses associated with using
a long run of lossy cable! And the RG6 is cheap!

> I experimented a bit more and found that the combination Oncore plus
> hockey puck antenna works fine with +/- 18m of RG58 cable between them
> (work fine meaning that the receiver sees and locks on >3 satellites and
> can do a 2 D fix), with 24m it strongly starts to depend on the location
> of the antenna and with 30m of cable, the unit still sees satellites but
> doesn't want to lock on them, either because the S/R ratio gets too low or
> because there is too much loss in the cable.

The critical diagnostic you see with either SHOWTIME or TAC32 is the SNR
"S-meter" bar chart display. With a good antenna, the strongest signal
should have an SNR of 30 dB or more. The nature of GPS's spread spectrum
coding with the C/A code is that you have only ~24-25 dB of dynamic range
between the strongest and weakest satellite, and your ONCORE requires an
minimum (in Motorola units) of ~5 dB SNR for the weakest satellite. If
you start seeing the maximum SNR dropping into the mid-20 dB range, then
either your antenna is bad or the coax is too lossy.

> This is a bit of a set-back, in particular since I was under the
> impression that long cables with the Oncore weren't a problem.   So,
>
> 1. From this list, I got the impression that people had run 100..150
>   feet of cable between antenna and receiver (=30..50 meters). Is
>   this correct or did I mix up units here?

Yes, with (a) good cable and/or (b) extra amplifiers, I have run over
100 meters!

> 2. Does anybody have any experience with the new antenna, in particular
>   the maximum cable length?

I like the performance of the new Motorola "Antenna97". It comes equipped
with ~6 meters of the very lossy RG174 cable (which is nice because it is
very flexible and can easily go thru the weather seal on a car door). And
even with the lossy cable, I get SNRs in the 30+ range.

Given the relative cable losses in the table above, I would think that the
little Antenna 97 would drive 50 meters or more of 9913, RG8 or RG6 with
no problem if you cut the RG174 cable at a point ~1 meter from the antenna.

> 3. Does anybody know of other antennas that work with the Oncore and
>   can be used with long cables.

I've used many types. The old Trimble "white hockey puck" circa 1993 worked
well. The new Motorola Antenna97 works well. I was always disappointed
with the performance of the ~10 cm diameter (usually gray, but I did see
one in white) "Motorola Mushroom" antenna.

> 4. The new antenna docs mentions RG-174 coax instead of RG-58. Would
>   it help to use this kind of cable with the old antenna? From
>   what I've seen, it appears that they're both 50 Ohm cables, but the
>   losses in RG174 are a bit lower.

It looks like they made the preamp have enough gain to accommodate the
cable
losses in the 174, and that they chose 174 because it is small and very
flexible. The 174 cable per se has >>NO<< magic associated with it!

> 5. Is there any way I can adjust the S/R level where the Oncore
>   locks on a satellite in software? (or something like that).

Basically no. Use the displayed SNR as I described above as a diagnostic.

Regards, Tom

49. RE: [TACGPS:1802] Motorola Antennas (again)

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Wed, 26 Aug 1998 17:59:09 -0400
To: <tacgps@tapr.org>
Message-ID: <000001bdd13c$c087a540$5f1d5c18@john.tampabay.rr.com>
Rendered body type: text/plain

Add the Garmin GPS 45XL GA28 antenna to the recommended list. I have used
one with ~50 ft of RG58 for over two years and it works quite well.

John W4SF

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Henk
Uijterwaal (RIPE-NCC)
Sent: Wednesday, August 26, 1998 2:55 PM
To: tacgps@tapr.org
Subject: [TACGPS:1802] Motorola Antennas (again)

Hi all,

Over the last months, we installed TAC's with Motorola Oncore's and
"hockey puck" antennas at several sites. At 3 sites, the antenna cable
had to be extended to something like 20..40m or 60..120 feet. At those
sites, the receiver doesn't seem to be able to find any satellites.
However, wehen the unit was returned and tested with only a few meteres of
cable between TAC and antenna, it worked fine.

I experimented a bit more and found that the combination Oncore plus
hockey puck antenna works fine with +/- 18m of RG58 cable between them
(work fine meaning that the receiver sees and locks on >3 satellites and
can do a 2 D fix), with 24m it strongly starts to depend on the location
of the antenna and with 30m of cable, the unit still sees satellites but
doesn't want to lock on them, either because the S/R ratio gets too low or
because there is too much loss in the cable.

This is a bit of a set-back, in particular since I was under the
impression that long cables with the Oncore weren't a problem.   So,

1. From this list, I got the impression that people had run 100..150
   feet of cable between antenna and receiver (=30..50 meters). Is
   this correct or did I mix up units here?

2. Does anybody have any experience with the new antenna, in particular
   the maximum cable length?

3. Does anybody know of other antennas that work with the Oncore and
   can be used with long cables.

4. The new antenna docs mentions RG-174 coax instead of RG-58. Would
   it help to use this kind of cable with the old antenna? From
   what I've seen, it appears that they're both 50 Ohm cables, but the
   losses in RG174 are a bit lower.

5. Is there any way I can adjust the S/R level where the Oncore
   locks on a satellite in software? (or something like that).

Any other suggestions? Thanks for your help,

Henk

--
Henk Uijterwaal   Email: henk.uijterwaal@ripe.net
RIPE Network Coordination Centre   WWW: http://www.ripe.net/home/henk
Singel 258   Phone: +31.20.535-4414, Fax -4445
1016 AB Amsterdam   Home: +31.20.4195305
The Netherlands   Pager: +31.6.57626855

--

%DCL-E-NOCFFE, unable to locate coffee - keyboard input suspended.

50. Using 75 ohm cable (Was:Re: [TACGPS:1804] Re: Motorola Antennas (again))

From: Terje Mathisen <Terje.Mathisen@hda.hydro.com>
Date: Thu, 27 Aug 1998 08:31:08 +0200
To: tacgps@tapr.org
Message-ID: <35E4FD2C.1C4F@hda.hydro.com>
Rendered body type: text/plain

Dr Thomas A Clark (W3IWI) wrote:
[snip]
>   (Loss at GPS per meter) = (Loss at 1 GHz per 100 feet)/24

>
> Approximate Losses @ 1 GHz:
>   9913 and some other air insulated ~11 mm diameter cables = 4.5 dB/100'
>   ~ 10 mm diameter RG8 or RG214   = 8.4
>   ~ 7mm RG6 75 ohm foam cable used for K-band TV satellites = 10
>   ~ 8 mm diameter foam dielectric RG8X or "Mini-8" cable   = 13
>   ~ 6 mm RG58 cables   = 24
>   ~ 3 mm RG174 cable   = 30
[snip]
> Since its losses are low and since it is easily available here in the
> USA (and I presume in NL), I'd suggest you experiment with the 75 ohm
> "RG6" foam cable. Here we can but it at our local Radio Shack or Best
> Buy store to connect the 50 cm diameter K-band TV satellite dishes to
> their electronics. The IF that is fed down the cable on these systems
> is in the 900-1400 MHz range, so the cable is designed for good
> performance around the GPS frequency. Some purists will criticise me
> for suggesting the use of 75 ohm cable in a 50 ohm system. But believe
> me, the added losses associated with a 1.5:1 VSWR due to the impedance
> mismatch are trivial compared with the losses associated with using
> a long run of lossy cable! And the RG6 is cheap!

Interesting...

Way back when, I remember doing the math to figure out optimum antenna
cable impedances:

For a transmitter (or combined transmitter/receiver), the optimal value
was very close to 50 ohm (around 49.7?), when optimizing for ability to
carry energy _to_ the antenna.

OTOH, when optimizing for low loss, I recall getting something like
72-73 ohm, i.e. close to the 75 ohm used in TV cable systems.

So, assuming my memory hasn't detoriated quite as much as my ability to
actually figure these things out from scratch, why aren't all GPS
systems set up to use 75 ohm cable?

Terje

--
- <Terje.Mathisen@hda.hydro.com>
Using self-discipline, see http://www.eiffel.com/discipline
"almost all programming can be viewed as an exercise in caching"

51. Re: [TACGPS:1803] RE: Motorola Antennas (again)

From: Kenneth Lerman <Kenneth.Lerman@lerman.nai.net>
Date: Thu, 27 Aug 1998 07:25:50 -0400 (EDT)
To: tacgps@tapr.org
Cc: lerman@lerman.nai.net (Kenneth Lerman)
Message-ID: <199808271125.AA09914@lerman.nai.net>
Rendered body type: text/plain

If all else fails, why not mount the receiver near the antenna? The
practical range of RS-232 is on the order of hundreds of feet.
Appropriate drivers could increase it way beyond that. Of course, you
would have to adjust for the time delay (if you are using it for timing).

Ken
>
> > -----Original Message-----
> > From: Henk Uijterwaal (RIPE-NCC) [SMTP:henk@ripe.net]
> > Sent: Wednesday, August 26, 1998 1:55 PM
> > To: tacgps@tapr.org
> > Subject: [TACGPS:1802] Motorola Antennas (again)
> >
> > Hi all,
> >
> > Over the last months, we installed TAC's with Motorola Oncore's and
> > "hockey puck" antennas at several sites. At 3 sites, the antenna
> > cable
> > had to be extended to something like 20..40m or 60..120 feet. At
> > those
> > sites, the receiver doesn't seem to be able to find any satellites.
> > However, wehen the unit was returned and tested with only a few
> > meteres of
> > cable between TAC and antenna, it worked fine.
> >
> > I experimented a bit more and found that the combination Oncore plus
> > hockey puck antenna works fine with +/- 18m of RG58 cable between them

> > (work fine meaning that the receiver sees and locks on >3 satellites
> > and
> > can do a 2 D fix), with 24m it strongly starts to depend on the
> > location
> > of the antenna and with 30m of cable, the unit still sees satellites
> > but
> > doesn't want to lock on them, either because the S/R ratio gets too
> > low or
> > because there is too much loss in the cable.
> >
> > This is a bit of a set-back, in particular since I was under the
> > impression that long cables with the Oncore weren't a problem.   So,
> >
> > 1. From this list, I got the impression that people had run 100..150
> >   feet of cable between antenna and receiver (=30..50 meters). Is
> >   this correct or did I mix up units here?
> >
> > 2. Does anybody have any experience with the new antenna, in
> > particular
> >   the maximum cable length?
> >
> > 3. Does anybody know of other antennas that work with the Oncore and
> >   can be used with long cables.
> >
> > 4. The new antenna docs mentions RG-174 coax instead of RG-58. Would
> >   it help to use this kind of cable with the old antenna? From
> >   what I've seen, it appears that they're both 50 Ohm cables, but the
> >   losses in RG174 are a bit lower.
> >
> > 5. Is there any way I can adjust the S/R level where the Oncore
> >   locks on a satellite in software? (or something like that).
> >
> >
> > Any other suggestions? Thanks for your help,
> >
> > Henk
> >
> > --
> > --------
> > Henk Uijterwaal   Email: henk.uijterwaal@ripe.net
> > RIPE Network Coordination Centre   WWW:
> > http://www.ripe.net/home/henk
> > Singel 258   Phone: +31.20.535-4414, Fax -4445
> > 1016 AB Amsterdam   Home: +31.20.4195305
> > The Netherlands   Pager: +31.6.57626855
> > --
> > --------
> >
> > %DCL-E-NOCFFE, unable to locate coffee - keyboard input suspended.
> >
>

--
Kenneth Lerman   Kenneth.Lerman@lerman.nai.net
Systems Essentials Limited   Fax: (203)426-9138
55 Main Street   Voice: (203)426-4430
Newtown, CT 06470   http://lerman.nai.net/~lerman
PGP fingerprint = B1 66 29 FB CB 8C 6A 24 E1 DF B4 63 2C D6 5D AD

52. Re: [TACGPS:1804] Re: Motorola Antennas (again)

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Thu, 27 Aug 1998 14:18:45 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980827141845.008182e0@appstate.campus.mci.net>
Rendered body type: text/plain

>Note that in general, the bigger the cable, the lower the loss. Also note
>that cables with air or foam dielectric have lower loss than those with
>solid plastic. I gather you have only considered the two worst cables
>in this list so far.

I used some air-core coax for the 70cm antenna side of my satellite setup.
In less than a year it accumulated so much moisture that the loss was 100%.
 Wireman Inc. does not recommend air-core for outside use as it is too
difficult to keep moisture out (even with N connectors). Apparently the
daily heating/cooling draws in humid air that condenses and runs down to
the bottom of the coax. When I opened up the coax water had filled the
first 2 or 3 inches--more like cutting into a hose than a coax! Wireman

recommends a foam type core. I replaced the air-core with a foam and measured the loss to the antenna (at 435 Mhz). There was no measurable difference, and it has held up for 3 years. I live in the mountains of NC and the relative humidity is very high. Someone in a dry climate might not have as much trouble with air-core coax.

Regards,

Don, W4DH

53. RE: Antennas & long cable runs...

From: Mastenbrook Gary-G13216 <g13216@email1.wes.mot.com>
Date: Thu, 27 Aug 1998 13:38:03 -0500
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <51F347B016ADD011963200805FC1456202C0B48C@email1.wes.mot.com>
Rendered body type: text/plain

All- Saw Tom's excellent response earlier and thought I'd post my direct response here as well...
Gary N8DMT
-----Original Message-----
From: Gary Mastenbrook-G13216
[mailto:Gary_Mastenbrook-G13216@email.mot.com]
Sent: Wednesday, August 26, 1998 3:13 PM
To: henk@ripe.net
Subject: [TACGPS:1803] RE: Motorola Antennas (again)

Henk- Hope you already have answers to your questions, but if not, here's my two cents...

1. Cable length (max). There is not really a maximum cable length specified for the receiver/antenna system. Instead, the loss of the cable (max) needs to be kept to the point where the S/N at the receiver is still above the minimum tracking threshold. I don't have the exact numbers for the maximum loss (given a patch antenna with built-in preamp and filter), but suspect that it is around 15-20 dB loss maximum. I've used long runs of cable between the antenna and the receiver, but usually use a combination of cable types. Cables used include: 20 feet of RG-58 (a short run in the laboratory), 100 feet or more of Andrews LDF-4-50 (1/2 inch hardline) running up to the roof area, and 20 feet of RG-174 (leading to the antenna). If you guess at the loss for the cable system it might be something like: RG-58; 5 dB, LDF-4-50; 4 dB, RG-174; 5 dB. Add it up and you get 14 dB or so. This works fine for the 8-10 systems like this that have been put into our laboratory area. (Please contact me directly for exact details if desired.)

2. I've deployed 4 or so systems which use the new antenna. I typically mount it on a ground plane (usually some HVAC ducting already present on the roof of the building) and find it works just as well as the larger/older style. From within the lab area, they are identical in performance such that the user's do not notice the difference.

3. Most outdoor survivable antennas will work provided they have an active pre-amp and some minimal level of filtering. I've used some of the Japanese Marine-type antennas with success at home for short term use only. (Had doubts about long term stability of materials used, so switched back to the 'puck'.) If you're trying to put up an antenna at a communications site (cellular or broadcast), you might wish to measure the level of non-GPS signals coming through before finalizing the design. May need to check for common mode RF as well... Some antennas offer better out-of-band rejection than others. (Sorry, no further info. available from me. Maybe others have this info?)

4. Be sure to use a coaxial cable rated for appropriate environmental exposure. If deploying a fixed system, you will not be too happy if you need to replace the outside cables every year if their outer coating cracks and develops intrusion points for moisture, so use the best cables available. I do not believe that the smaller coax (RG-174) has superior loss numbers compared to good RG-58 type cables, and thus recommend the larger cable be used. The GPS mobile installation market wishes to use the least expensive and smallest cable possible, and that has driven the antenna market to RG-174 and other small types of cable. It's not a real problem if the antenna comes with RG-174 feeder cable, just use it in conjunction with better cables for the remainder of the run, or cut it short and replace the rest of the length with decent low loss cable. (Depending on connectors used at the TAC, that RF connector cut off from the antenna might come in handy--given the ability to put connectors on RG-174 cable.)

5. S/R threshold setting. I'm not aware of any option to force a
Motorola receiver to stop trying to track a satellite above its lowest
elevation threshold setting. Most of the Motorola receivers are used in
'highest in sky' mode and automatically pick the best sats to use if
they're above the minimum elevation. I believe if you fix your cable
attenuation issue, the need for S/R threshold setting will disappear.

Closing thoughts: For best performance, use the best cable available
within your budget. I use the combination specified in #1 above with
great success and have no issues with poor fixes or bad S/N at any time
here in the Chicago USA area. With the antennas 'stuck' on the HVAC
ducting, I do not bother with screwing them down (just use magnet mount
functionality), but am careful to route all cables such that excessive
snowfall or tromping maintenance personnel will not disturb the antennas
or stress the cables. Safety first!

Good luck & please feel free to ask more questions if these comments are
not clear.

73's

Gary N8DMT
Motorola Telematics
Chicago, Illinois USA

> -----Original Message-----
> From: Henk Uijterwaal (RIPE-NCC) [SMTP:henk@ripe.net]
> Sent: Wednesday, August 26, 1998 1:55 PM
> To: tacgps@tapr.org
> Subject: [TACGPS:1802] Motorola Antennas (again)
>
snip
>
> 1. From this list, I got the impression that people had run 100..150
>   feet of cable between antenna and receiver (=30..50 meters). Is
>   this correct or did I mix up units here?
>
> 2. Does anybody have any experience with the new antenna, in
> particular
>   the maximum cable length?
>
> 3. Does anybody know of other antennas that work with the Oncore and
>   can be used with long cables.
>
> 4. The new antenna docs mentions RG-174 coax instead of RG-58. Would
>   it help to use this kind of cable with the old antenna? From
>   what I've seen, it appears that they're both 50 Ohm cables, but the
>   losses in RG174 are a bit lower.
>
> 5. Is there any way I can adjust the S/R level where the Oncore
>   locks on a satellite in software? (or something like that).
>
>
> Any other suggestions? Thanks for your help,
>
> Henk
>
snip

54. Re: Using 75 ohm cable (Was:Re: Re: Motorola Antennas (again))

From: Bob Johnson <bobj@atlantic.net>
Date: Fri, 28 Aug 1998 02:52:27 -0400
To: tacgps@tapr.org
Message-ID: <3.0.2.32.19980828025227.006cd7e4@mail.atlantic.net>
Rendered body type: text/plain

At 09:24 AM -0500, you wrote:
>Date: Thu, 27 Aug 1998 08:31:08 +0200
>From: Terje Mathisen <Terje.Mathisen@hda.hydro.com>
>To: tacgps@tapr.org
>Subject: Using 75 ohm cable (Was:Re: Re: Motorola Antennas (again))
[...]
>Interesting...
>
>Way back when, I remember doing the math to figure out optimum antenna
>cable impedances:
>

>For a transmitter (or combined transmitter/receiver), the optimal value
>was very close to 50 ohm (around 49.7?), when optimizing for ability to
>carry energy _to_ the antenna.
>
>OTOH, when optimizing for low loss, I recall getting something like
>72-73 ohm, i.e. close to the 75 ohm used in TV cable systems.
>
>So, assuming my memory hasn't detoriated quite as much as my ability to
>actually figure these things out from scratch, why aren't all GPS
>systems set up to use 75 ohm cable?
>
>Terje

As I recall:

Minimum attenuation for a given outside diameter occurs in cable with
approximately 75 ohm impedance (I think the theoretical value is
72-point-whatever).

Maximum power-transmission capacity occurs for approximately 30 ohm impedance.

Maximum voltage rating (which often limits power handling in real life)
occurs at about 60 ohm impedance.

I don't remember exactly where the 50-ohm standard comes from, but I
vaguely recall that it produces maximum S/N ratio, at least when you
consider the receiver circuit it will have to transfer power into. If that
is the case, it explains why 50 ohm cable is used for weak-signal
applications such as receivers. It is also a good compromise for
transmitters.

In systems where loss per unit length is more important than ultimate S/N,
75 ohm cable would be preferred. Cable television systems seem like a good
example of this, because the cost of installing amplifiers at intervals is
significant, so you want to use the lowest-loss cable available. Since
signal levels are kept relatively high, ultimate S/N ratio is not as
significant.

These values are based on some general assumptions that may not hold in a
particular situation, anyway. Since copper losses are proportional to the
square root of frequency, while dielectric losses are more linearly
proportional to frequency, the slope of the loss-vs-frequency plot for a
given cable depends slightly on its construction. A very old chart (WW-II
era) I have shows, for example, that "standard" military RG-58 (50 ohm) has
lower loss than RG-59 (75 ohm) for frequencies below 10 MHz, but greater
loss at higher frequencies. Modern cables will only approximately have the
same characteristics as those early cables did, so YMMV. You have to
either get specs from the manufacturer or measure your actual values if you
want to push performance of a cable to the limit.

-- Bob Johnson
   WB4JCM

55. Re: [TACGPS:1808] Re: Motorola Antennas (again)

From: Glenn Little <glittle@awod.com>
Date: Fri, 28 Aug 1998 07:46:53 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.16.19980828074653.416704ca@awod.com>
Rendered body type: text/plain

Air core hardline should be kept pressurized with dry air to prevent the
moisture proble,. There are special fittings that allow for air
pressurization. This is the type of hardline that the pros use for low loss.

At 01:25 PM 8/27/98 -0500, you wrote:
>>Note that in general, the bigger the cable, the lower the loss. Also note
>>that cables with air or foam dielectric have lower loss than those with
>>solid plastic. I gather you have only considered the two worst cables
>>in this list so far.
>
>I used some air-core coax for the 70cm antenna side of my satellite setup.
>In less than a year it accumulated so much moisture that the loss was 100%.
> Wireman Inc. does not recommend air-core for outside use as it is too
>difficult to keep moisture out (even with N connectors). Apparently the
>daily heating/cooling draws in humid air that condenses and runs down to
>the bottom of the coax. When I opened up the coax water had filled the
>first 2 or 3 inches--more like cutting into a hose than a coax! Wireman
>recommends a foam type core. I replaced the air-core with a foam and
>measured the loss to the antenna (at 435 Mhz). There was no measurable

>difference, and it has held up for 3 years. I live in the mountains of NC
>and the relative humidity is very high. Someone in a dry climate might not
>have as much trouble with air-core coax.
>
>Regards,
>
>Don, W4DH
>
>
>


```
------------------------------------------------------------------------------
Glenn Little                          glittle@awod.com   QCWA  LM 28417
Amateur Callsign:  WB4UIV             wb4uiv@amsat.org   AMSAT LM 2178
QTH:  Goose Creek, SC USA (EM92xx)                       ARRL  TAPR
------------------------------------------------------------------------------
```


56. Re: [TACGPS:1810] Re: Using 75 ohm cable

From: Kenneth Lerman <Kenneth.Lerman@lerman.nai.net>
Date: Fri, 28 Aug 1998 13:08:15 -0400 (EDT)
To: tacgps@tapr.org
Message-ID: <199808281708.AA23844@lerman.nai.net>
Rendered body type: text/plain

...
>
> As I recall:
>
> Minimum attenuation for a given outside diameter occurs in cable with
> approximately 75 ohm impedance (I think the theoretical value is
> 72-point-whatever).
>
> Maximum power-transmission capacity occurs for approximately 30 ohm impedance.
>
> Maximum voltage rating (which often limits power handling in real life)
> occurs at about 60 ohm impedance.
>
> I don't remember exactly where the 50-ohm standard comes from, but I
> vaguely recall that it produces maximum S/N ratio, at least when you
> consider the receiver circuit it will have to transfer power into. If that
> is the case, it explains why 50 ohm cable is used for weak-signal
> applications such as receivers. It is also a good compromise for
> transmitters.

Isn't 52 ohms the impedence of a 1/2 wave dipole?

Ken


```
--
Kenneth Lerman                        Kenneth.Lerman@lerman.nai.net
Systems Essentials Limited                       Fax: (203)426-9138
55 Main Street                                Voice: (203)426-4430
Newtown, CT 06470                     http://lerman.nai.net/~lerman
PGP fingerprint =  B1 66 29 FB CB 8C 6A 24  E1 DF B4 63 2C D6 5D AD
```


57. Re: [TACGPS:1812] Re: Using 75 ohm cable

From: Kenneth Lerman <Kenneth.Lerman@lerman.nai.net>
Date: Fri, 28 Aug 1998 13:57:14 -0400 (EDT)
To: tacgps@tapr.org
Message-ID: <199808281757.AA24259@lerman.nai.net>
Rendered body type: text/plain

>
> ..
> >
> > As I recall:
> >
> > Minimum attenuation for a given outside diameter occurs in cable with
> > approximately 75 ohm impedance (I think the theoretical value is
> > 72-point-whatever).
> >
> > Maximum power-transmission capacity occurs for approximately 30 ohm impedance.
> >
> > Maximum voltage rating (which often limits power handling in real life)
> > occurs at about 60 ohm impedance.
> >
> > I don't remember exactly where the 50-ohm standard comes from, but I
> > vaguely recall that it produces maximum S/N ratio, at least when you
> > consider the receiver circuit it will have to transfer power into. If that
> > is the case, it explains why 50 ohm cable is used for weak-signal

> > applications such as receivers. It is also a good compromise for
> > transmitters.
>
> Isn't 52 ohms the impedence of a 1/2 wave dipole?

Wrong. 52 ohms is the impedence of a 1/4 wave vertical. 75 ohms is
the impedence of a 1/2 wave dipole.

It's been a long time since I thought about this stuff.

KL

>
> Ken
>
> --
> Kenneth Lerman   Kenneth.Lerman@lerman.nai.net
> Systems Essentials Limited   Fax: (203)426-9138
> 55 Main Street   Voice: (203)426-4430
> Newtown, CT 06470   http://lerman.nai.net/~lerman
> PGP fingerprint = B1 66 29 FB CB 8C 6A 24 E1 DF B4 63 2C D6 5D AD
>

--
Kenneth Lerman   Kenneth.Lerman@lerman.nai.net
Systems Essentials Limited   Fax: (203)426-9138
55 Main Street   Voice: (203)426-4430
Newtown, CT 06470   http://lerman.nai.net/~lerman
PGP fingerprint = B1 66 29 FB CB 8C 6A 24 E1 DF B4 63 2C D6 5D AD

58. Re: [TACGPS:1812] Re: Using 75 ohm cable

From: Boyd Prestwood <w2hob@uscom.com>
Date: Fri, 28 Aug 1998 17:02:47 -0400
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19980828170247.007000ec@mail.uscom.com>
Rendered body type: text/plain

At 12:18 PM 8/28/98 -0500, you wrote:
>Isn't 52 ohms the impedence of a 1/2 wave dipole?
>
>Ken

W2HOB RESPONSE: A half-wave dipole's impedance is 75-ohms horizontal but
approaches 50-ohms as its ends approach the ground... like in an inverted-V.

Have fun es 73 de Boyd

59. Re: [TACGPS:1812] Re: Using 75 ohm cable

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Fri, 28 Aug 1998 17:23:11 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980828172311.0083a560@appstate.campus.mci.net>
Rendered body type: text/plain

This thread stirred my interest, particularly the transmit v receive v
S/N... I pulled out my ancient Dover book (1948), Microwave Transmission
Design Data, T. Moreno. A graph of curves shows optimums for: attenuation,
breakdown voltage, and power-carrying capacity. These optimums are not at
the same outer/inner diameter ratio. For minimum attenuation the
outer/inner ratio is 3.6 and yields a characteristic impedance of 77 ohms
with an air dielectric. A solid dielectric would bring this down near 50
ohms. I presume this is why 50 ohms has been a standard; I haven't seen
this in writing, however.

A resonant dipole is 72 ohms *balanced* (e.g. twin lead). A 1/4 wave whip
with "drooping" radials comes out to about 50 ohms and is unbalanced (i.e.
coax).

At 12:18 PM 8/28/98 -0500, you wrote:
>..
>>
>> As I recall:
>>
>> Minimum attenuation for a given outside diameter occurs in cable with
>> approximately 75 ohm impedance (I think the theoretical value is
>> 72-point-whatever).

>>
>> Maximum power-transmission capacity occurs for approximately 30 ohm
impedance.
>>
>> Maximum voltage rating (which often limits power handling in real life)
>> occurs at about 60 ohm impedance.
>>
>> I don't remember exactly where the 50-ohm standard comes from, but I
>> vaguely recall that it produces maximum S/N ratio, at least when you
>> consider the receiver circuit it will have to transfer power into. If that
>> is the case, it explains why 50 ohm cable is used for weak-signal
>> applications such as receivers. It is also a good compromise for
>> transmitters.
>
>Isn't 52 ohms the impedence of a 1/2 wave dipole?
>
>Ken

60. RE: [TACGPS:1813] Re: Using 75 ohm cable

From: "Victor A. Kean, Jr." <vkean@ds.net>
Date: Fri, 28 Aug 1998 22:02:05 -0400
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <01BDD2CF.7F1FDDE0@desk.k1lt.ampr.org>
Rendered body type: text/plain

>> Isn't 52 ohms the impedence of a 1/2 wave dipole?
>
>Wrong. 52 ohms is the impedence of a 1/4 wave vertical. 75 ohms is
>the impedence of a 1/2 wave dipole.

Wrong. 37.5 ohms is the impedence of a 1/4 wave vertical, half of a dipole, because it has half of the radiation resistance.

Vic, K1LT

61. How does L1 reception work?

From: "Pete Prossen" <prossen@znet.com>
Date: Fri, 28 Aug 1998 19:47:19 -0700
To: "Tapr GPS list server" <tacgps@tapr.org>
Message-ID: <199808290251.TAA05625@sd.znet.com>
Rendered body type: text/plain

I've been hesitating to ask these questions, hoping I would stumble on the subject in some document somewhere. But I'm still ignorant.

If all satellites of the GPS constellation transmit on the same frequency, how does a receiver discriminate each individual sat's modulation?

I now know that the phase center of the antenna is the range measurement point, and that the interconnecting cable has no influence on the range measurements. But what is the nature of the signal on that coax that still allows each individual sat to be isolated for measurement?

Finally, the Wide Area Augmentation System (WAAS) supposedly uses the same L1 frequency to broadcast some kind of correction information, although at 4 or 5 times the bit rate of the GPS satellites. Next generation receivers are supposed to be able to accommodate that signal too, in addition to that of all the sats.

I'd really like to know how all this is possible. An explanation would be really great, but a pointer to a reference would be appreciated just as much.

Regards

Pete Prossen
WA6ZUH

62. Re: [TACGPS:1817] How does L1 reception work?

From: "Steve Sampson" <ssampson@usa-site.net>
Date: Sat, 29 Aug 1998 07:38:00 -0500
To: <tacgps@tapr.org>
Message-ID: <002b01bdd349$dc261ac0$87228cd1@dodge.usa-site.net>
Rendered body type: text/plain

>If all satellites of the GPS constellation transmit on the same frequency,
>how does a receiver discriminate each individual sat's modulation?

The system is based on Spread Spectrum. The satellites do not transmit
on the same frequency. The frequency listed, is a center frequency, but
the RF is spread using seperate pseudo-random bit streams for each
satellite. You might do a search on that subject.

>I now know that the phase center of the antenna is the range measurement
>point, and that the interconnecting cable has no influence on the range
>measurements. But what is the nature of the signal on that coax that still
>allows each individual sat to be isolated for measurement?

It's just RF on the coax (multiple spread spectrum sources). The receiver
correlates the seperate signals into multiple processing paths.

If you view a 1 KHz square wave on a spectrum analyzer, you would get
a 1 KHz main lobe with a bunch of spectral lines that are based on the
pulse-width. Change the pulse width, and the spectrum changes. You still
have the 1 KHz main lobe but the spectral lines have all moved.

Make two of these and transmit them to a single receiver. You can see
that while both are at 1 KHz center frequency, there are two sets of
spectral lines, each can be separately decoded, for two data streams.

Steve

63. Re: How does L1 reception work?

From: Bob Johnson <bobj@atlantic.net>
Date: Sat, 29 Aug 1998 12:15:53 -0400
To: tacgps@tapr.org
Message-ID: <3.0.2.32.19980829121553.0071e54c@mail.atlantic.net>
Rendered body type: text/plain

>Date: Fri, 28 Aug 1998 19:47:19 -0700
>From: "Pete Prossen" <prossen@znet.com>
>To: "Tapr GPS list server" <tacgps@tapr.org>
>Subject: How does L1 reception work?

>If all satellites of the GPS constellation transmit on the same frequency,
>how does a receiver discriminate each individual sat's modulation?

The transmitted data is mixed with a psuedo-random bit sequence so that the
resulting signal has the same spectral characteristics as background noise
(well, mostly). Each satellite uses a different bit sequence. The
receiver essentially reverses that process using each of the possible bit
sequences. When it hits the correct bit sequence for one of the satellites
it hears, the data from that particular satellite becomes intelligible,
while the data from all of the other satellites still sound like background
noise. Thus, they can all share the same transmit frequence and be
distinguishable at the receiver. That is, in a very simplified form, the
basic principle of spread-spectrum technology.

>
>I now know that the phase center of the antenna is the range measurement
>point, and that the interconnecting cable has no influence on the range
>measurements. But what is the nature of the signal on that coax that still
>allows each individual sat to be isolated for measurement?

The signal on the coax is the same as what is received at the antenna.
It's just in the nature of the spread spectrum technique that the signal
can be mixed together and separated again later.

There are many, many, web pages devoted to explaining this stuff. You
might start at http://www.inmet.com/~pwt/gps_gen.htm . If you go to your
favorite search engine (mine this week is http://www.dogpile.com/) and do
a search for the word "pseudorange" you will probably find mountains of
stuff discussing details of how GPS works.

-- Bob Johnson
   WB4JCM

64. Benchmark coordinates

From: "Charles E. Heisler" <cheisler@cyberia.com>
Date: Sat, 29 Aug 1998 20:50:16 -0400
To: tacgps@tapr.org
Message-ID: <199808300155.5183100@cyberia.com>
Rendered body type: text/plain

Hi Gang;.....Some time ago there was a posting regarding
 a web site that would give you Benchmark coordinated in a area
 that you requested.   Would some one please send me that address?

        Thank you
          Charlie
          K3VDB

65. Re: [TACGPS:1820] Benchmark coordinates

From: Tom Cox <trcox@worldnet.att.net>
Date: Sat, 29 Aug 1998 20:22:56 -0400
To: tacgps@tapr.org
Message-ID: <v04003a00b20e4bb7e880@[12.66.35.34]>
Rendered body type: text/plain

At 7:50 PM -0500 8/29/98, Charles E. Heisler wrote:

>   Hi Gang;.....Some time ago there was a posting regarding
> a web site that would give you Benchmark coordinated in a area
> that you requested.   Would some one please send me that address?
>
I think you want

        http://WWW.ngs.noaa.gov/FORMS/ds_area.html

September 1998

Original source file: tacgps.9809
Source: http://ftp.tapr.org/product_docs/TAC2/mail_archives/tacgps.9809

1. oncore connector

From: shelden3@ionet.net
Date: Sun, 6 Sep 1998 02:55:48 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199809060755.CAA03061@mail.ionet.net>
Rendered body type: text/plain

I just received a Motorola VP Oncore, does anyone know of a source
for the OSX connector for the antenna plug? Thanks for any information in
advance.

Charlie KC5NBH

---

2. Re: [TACGPS:1822] oncore connector

From: "Steven R. Bible" <srbible@gate.net>
Date: Sun, 06 Sep 1998 07:52:53 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980906075253.00914460@pop.gate.net>
Rendered body type: text/plain

At 02:57 AM 9/6/98 -0500, you wrote:
>   I just received a Motorola VP Oncore, does anyone know of a source
>for the OSX connector for the antenna plug? Thanks for any information in
>advance.

Charlie,

TAPR sells a RF pigtail that has the MCX connector on one end and nothing
on the other. The coax is 24" (I think) of RG-174.

The connectors can be bought at Digikey, but you need a crimping tool to
install them.

- Steve
(n7hpr@tapr.org)

---

3. Re: [TACGPS:1822] oncore connector

From: Boyd Prestwood <w2hob@uscom.com>
Date: Sun, 06 Sep 1998 11:03:20 -0400
To: tacgps@tapr.org
Message-ID: <3.0.1.32.19980906110320.006e133c@mail.uscom.com>
Rendered body type: text/plain

At 02:57 AM 9/6/98 -0500, you wrote:
>   I just received a Motorola VP Oncore, does anyone know of a source
>for the OSX connector for the antenna plug? Thanks for any information in
>advance.
>
>   Charlie KC5NBH

W2HOB RESPONSE: Charlie, check the <www.tapr.org> GPS page. They have a
pigtail available for $15.

Have fun es 73 de Boyd

---

4. Re: [TACGPS:1822] oncore connector

From: "Henk Uijterwaal (RIPE-NCC)" <henk@ripe.net>
Date: Mon, 7 Sep 1998 09:49:20 +0200 (MET DST)
To: tacgps@tapr.org
Message-ID: <Pine.SUN.3.95.980907094456.4638C-100000@ncc.ripe.net>
Rendered body type: text/plain

On Sun, 6 Sep 1998 shelden3@ionet.net wrote:

>   I just received a Motorola VP Oncore, does anyone know of a source
> for the OSX connector for the antenna plug? Thanks for any information in
> advance.

I've order them (through a local distributor) from The Phoenix Company,

555 Pond Drive, Wood Dale, IL 60191-1192, phone 1-800-323-9562.

They have connectors, tools to attach them to a cable as well as several
off-the-shelf cables with a OSX connector on one or both ends.

Henk

Henk Uijterwaal   Email: henk.uijterwaal@ripe.net
RIPE Network Coordination Centre   WWW: http://www.ripe.net/home/henk
Singel 258   Phone: +31.20.535-4414, Fax -4445
1016 AB Amsterdam   Home: +31.20.4195305
The Netherlands   Pager: +31.6.57626855

%DCL-E-NOCFFE, unable to locate coffee - keyboard input suspended.

5. mcx connector

From: shelden3@ionet.net
Date: Mon, 7 Sep 1998 08:19:32 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199809071319.IAA26603@mail.ionet.net>
Rendered body type: text/plain

Thanks to all for the information, a friend of mine came over and
looked at the connector and said "hey i hve on of those in my van". Sure
enough he did, it was sold by garman but works just the same. Once again
thanks for the responses.

Charlie

6. RE: [TACGPS:1793] TAC32 forwarded help request

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Mon, 7 Sep 1998 18:51:53 -0400
To: <LUCIANO_PARAMITHIOTTI@HP-Italy-om4.om.hp.com>, <tacgps@tapr.org>
Message-ID: <001301bddab2$1b560ce0$101161cf@rick.cnssys.com>
Rendered body type: text/plain

Luciano,

I finally received a number of old model UT and GT receivers for testing.
My initial results show that Tac32 is working correctly.

> I am testing the tac32 with my Oncore UT but I have discovered that
> elevation and azimuth are not displayed on the screen and the sky map
> of the sat is empty.

This is correct. The message that conveys this information is the @@Bb.
The Oncore UT did not include this message until Version 1.6. The GT did not
include this message until Version 2.0 (the first GT+).

> Another problem is that if the software recognize the receiver
> the configuration page is forbidden to the user and is impossible to
> change the functions (example: timing or static application mode).

Tac32 is programmed to know what you can and cannot change based on the
receiver type version number. There are no changes on that page that will
work with the UT Version 1.3. Your workaround makes it look as though you
are changing the parameters but the reviver is not doing anything different.
For example, the UT Version 1.3 will only operate in 3-D mode. It does not
support the position hold or altitude hold messages.

The moral of the story is get a UT+ (version 2.0 or newer) or a VP version
8.8 or newer. Older UT and GT units can be reprogrammed with new firmware,
which will help. They still can only do what the hardware allows but most
functions can be activated this way. The price for Hams is $16 plus
shipping. Contact me if you are interested.

Rick
WB2TNL

-----Original Message-----
From: Richard M. Hambly [mailto:rick@cnssys.com]
Sent: Tuesday, August 25, 1998 11:27 AM
To: LUCIANO_PARAMITHIOTTI@HP-Italy-om4.om.hp.com; tacgps@tapr.org
Subject: RE: [TACGPS:1793] TAC32 forwarded help request

Luciano,

Just a quick note from the author of TAC32 to let you know that I am looking
into this. Unfortunately the only UT 1.3 receiver I have here is not
working. I am trying to get another one so I can complete the tests.   I
suspect a problem with TAC32. I will let you know.

Rick
WB2TNL

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Brooks Shera
Sent: Tuesday, August 18, 1998 5:34 PM
To: tacgps@tapr.org
Subject: [TACGPS:1793] TAC32 forwarded help request

I am forwarding the message below for consideration by the TAC-32
experts. Any ideas about what's wrong?

Brooks

>
>   I am testing the tac32 with my Oncore UT but I have discovered that
>   elevation and azimut are not displayed on the screen and the sky map
>   of the sat.is empty.Another problem is that if the software recognize
>   the receiver
>   the configuration page is forbitten to the user and is impossible to
>   change the functions (example: timing or static application mode).
>   The work around is to disconnect the serial cable PC/RX ,start the tac
>   and ,after the rx failure message reconnect the cable.This way permit
>   the correct receiver mode selection.Some help?
>   My receiver is a model R221A1111 software version 1 rev.3 (Motorola)
>   sw date sept 1996 HWDR P/N 1 SERIAL R000MU MANUFACTUR DATE 6G25.
>
>   Luciano
>
>LUCIANO_PARAMITHIOTTI@HP-Italy-om4.om.hp.com

7. GPS Question

From: Ron Raspet <rraspet@erols.com>
Date: Tue, 08 Sep 1998 07:34:09 -0400
To: tacgps@tapr.org
Message-ID: <35F51631.D87DC3FB@erols.com>
Rendered body type: text/plain

Friends,

I have access to a "TRIPMATE" Hyperformance GPS Navigation unit. The cpmpany
that sold this GPS receiver is DeLorme. When I asked DeLorme if this unit had a
1 pps signal, they told me that it would work on a serial port.

Does anyone know if it supoports the 1 pps signal?

Thanks Ron N3JLF

8. Re: [TACGPS:1828] GPS Question

From: "Eric A. Cottrell" <eac@shore.net>
Date: Tue, 08 Sep 1998 07:48:57 -0400
To: tacgps@tapr.org
Message-ID: <35F519A9.53A4@shore.net>
Rendered body type: text/plain

Ron Raspet wrote:
>
> Friends,
>
> I have access to a "TRIPMATE" Hyperformance GPS Navigation unit. The cpmpany
> that sold this GPS receiver is DeLorme. When I asked DeLorme if this unit had a
> 1 pps signal, they told me that it would work on a serial port.
>
> Does anyone know if it supoports the 1 pps signal?

Hello,

The Zodiac chipset used does support a 1 pps but it is not brought out
to the serial port. It is also unknown of the 1 pps is synced to
UTC although later firmware does claim this feature.

Look up the Tripmate FAQ at Peter Bennett's GPS website for more info.

73 Eric eac@shore.

9. Worst Case timing performance of Oncore?

From: John Ackermann N8UR <jra@febo.com>
Date: Fri, 11 Sep 1998 15:44:59 -0400
To: tacgps@tapr.org
Message-ID: <199809111944.PAA01953@meow.febo.com>
Rendered body type: text/plain

Does anyone have a feel for what the worst-case PPS performance of a 6
channel Oncore (the old style unit) would be? I'm interested in knowing
whether the worst case is still better than 1 microsecond, whether it
could be as much as a few milliseconds, or if it's somewhere in between,
just where that might be.

By "worst case," I mean running in 0D mode, but with lousy satellite geometry,
perhaps only 3 or 4 birds locked, loses lock occassionally, but in general is
locked and running.

I'm asking because I'm trying to understand performance of the ntp/kernel PLL
timekeeping in Linux, and I'm seeing some results that could lead one to
believe there's some amount of jitter on the PPS signal from the Oncore. I
am skeptical that's the case, but some info would help me rule the GPS in or
out as a problem.

Thanks,

John N8UR
jra@febo.com

10. Re: [TACGPS:1830] Worst Case timing performance of Oncore?

From: "James L. Johnson" <jjjohnson@saiph.hpl.hp.com>
Date: Mon, 14 Sep 1998 17:47:52 -0800 (PDT)
To: tacgps@tapr.org
Message-ID: <199809150047.RAA22057@saiph.hpl.hp.com>
Rendered body type: text/plain

> Date: Fri, 11 Sep 1998 14:47:05 -0500 (CDT)
> Sender: tacgps@tapr.org
> From: John Ackermann N8UR <jra@febo.com>
> To: tacgps@tapr.org
> Subject: [TACGPS:1830] Worst Case timing performance of Oncore?
>
> Does anyone have a feel for what the worst-case PPS performance of a 6
> channel Oncore (the old style unit) would be? I'm interested in knowing
> whether the worst case is still better than 1 microsecond, whether it
> could be as much as a few milliseconds, or if it's somewhere in between,
> just where that might be.
>
> By "worst case," I mean running in 0D mode, but with lousy satellite geometry,
> perhaps only 3 or 4 birds locked, loses lock occassionally, but in general is
> locked and running.
>
> I'm asking because I'm trying to understand performance of the ntp/kernel PLL
> timekeeping in Linux, and I'm seeing some results that could lead one to
> believe there's some amount of jitter on the PPS signal from the Oncore. I
> am skeptical that's the case, but some info would help me rule the GPS in or
> out as a problem.
>
> Thanks,
>
> John N8UR
> jra@febo.com
>
>

John,

   I ran your question by a colleague who has a lot of experience
with the Motorola receivers and here is his reply:

73,
Jim W6SC
jjohnson@hpl.hp.com

From: Robin P Giffard <giffard>

To: jjohnson@hpl.hp.com (Jim Johnson)
Date: Mon, 14 Sep 1998 17:28:01 -0800 (PDT)

Jim,

While a healthy 6-channel ONCORE is tracking at least one satellite in position-hold mode, the time error will not reach 1 microsecond. This assumes calibrated delays, and a satisfactory set of antenna coordinates. Tracking is indicated by a continuous mode=8 reading.

However, the older receivers do not have time "RAIM". This means that a single malfunctioning, or mis-programmed, satellite can pull the solution quite a lot. This is rare but has been known to happen. I believe that a single satellite showing an error of more than 60 microseconds will be eliminated if enough satellites remain for a fix. If the receiver loses its GPS time solution for any reason, the 1 PPS output will begin to drift backward in time at a rate of about 13 microseconds per second.

The more recent UT receiver has RAIM, and a bad satellite will be eliminated from the solution if there are 4 or more being tracked. This receiver can also be programmed to blank its 1 PPS pulse if no UTC fix is possible.

No RAIM algoritm can eliminate a bad satellite unless several are being tracked. So if you are tracking a single satellite in position hold, it had better be good.

Robin Giffard,
HP Labs.

11. TAPR.ORG Down and now Back

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Mon, 14 Sep 1998 21:09:36 -0500
To: "HF SIG list mailing"<hfsig@tapr.org>, " Spread Spectrum "<ss@tapr.org>,
" TAPR/AMSAT DSP "<dsp@tapr.org>,
"APRS SIG list mailing"<aprssig@tapr.org>,
"NETSIG list mailing"<netsig@tapr.org>,
"BBS SIG list mailing"<bbssig@tapr.org>,
" tacgps "<tacgps@tapr.org>, aprsnews, mic-e,
TAPR Regional Freq <regional_freq@tapr.org>
Message-ID: <v0401170fb2237bbfafc8@[207.8.125.53]>
Rendered body type: text/plain

TAPR.ORG was down on Saturday for a system upgrade. We installed a new processor board as well as added more memory and a new 9G HD.

Sunday morning very early, the root drive crashed and burned. Lee spent Sunday and today (Monday) recovering from the crash on root. We had backed up the system just before the upgrade, so we didn't get hit very hard. We took this time to also upgrade the OS on the system, which we had planned to in the future.

Lee got the system back operational about 6pm tonight and all aspects of the system should be operational by this posting. We will be spending the rest of tonight doing checks on various automatic operations to make sure that everything is running correctly.

Cheers - Greg

Greg Jones, WD5IVD
President TAPR (http://www.tapr.org)
PhD Candidate, Instructional Technology, UT Austin

email: wd5ivd@tapr.org
web: http://www.tapr.org/~wd5ivd

Experience is what you get when you were expecting something else.

12. Re: [TACGPS:1831] Re: Worst Case timing performance of Oncore?

From: John Ackermann N8UR <jra@febo.com>
Date: Tue, 15 Sep 1998 07:21:01 -0400
To: tacgps@tapr.org
Message-ID: <199809151121.HAA09195@meow.febo.com>
Rendered body type: text/plain

Thanks for the great information!

John

In message <199809150047.RAA22057@saiph.hpl.hp.com>, "James L. Johnson" writes:
>> Date: Fri, 11 Sep 1998 14:47:05 -0500 (CDT)
>> Sender: tacgps@tapr.org
>> From: John Ackermann N8UR <jra@febo.com>
>> To: tacgps@tapr.org
>> Subject: [TACGPS:1830] Worst Case timing performance of Oncore?
>>
>> Does anyone have a feel for what the worst-case PPS performance of a 6
>> channel Oncore (the old style unit) would be? I'm interested in knowing
>> whether the worst case is still better than 1 microsecond, whether it
>> could be as much as a few milliseconds, or if it's somewhere in between,
>> just where that might be.
>>
>> By "worst case," I mean running in 0D mode, but with lousy satellite geometr
>y,
>> perhaps only 3 or 4 birds locked, loses lock occassionally, but in general i
>s
>> locked and running.
>>
>> I'm asking because I'm trying to understand performance of the ntp/kernel PL
>L
>> timekeeping in Linux, and I'm seeing some results that could lead one to
>> believe there's some amount of jitter on the PPS signal from the Oncore. I
>> am skeptical that's the case, but some info would help me rule the GPS in or
>> out as a problem.
>>
>> Thanks,
>>
>> John N8UR
>> jra@febo.com
>>
>>
>
>
>John,
>
>   I ran your question by a colleague who has a lot of experience
>with the Motorola receivers and here is his reply:
>
>73,
>Jim W6SC
>jjohnson@hpl.hp.com
>--
>
>From: Robin P Giffard <giffard>
>To: jjohnson@hpl.hp.com (Jim Johnson)
>Date: Mon, 14 Sep 1998 17:28:01 -0800 (PDT)
>
>Jim,
>
> While a healthy 6-channel ONCORE is tracking at least one satellite in
> position-hold mode, the time error will not reach 1 microsecond. This
> assumes calibrated delays, and a satisfactory set of antenna coordinates.
> Tracking is indicated by a continuous mode=8 reading.
>
> However, the older receivers do not have time "RAIM". This means that a
> single malfunctioning, or mis-programmed, satellite can pull the solution
> quite a lot. This is rare but has been known to happen. I believe
> that a single satellite showing an error of more than 60 microseconds
> will be eliminated if enough satellites remain for a fix. If the
> receiver loses its GPS time solution for any reason, the 1 PPS output
> will begin to drift backward in time at a rate of about 13 microseconds
> per second.
>
> The more recent UT receiver has RAIM, and a bad satellite will be
> eliminated from the solution if there are 4 or more being tracked. This
> receiver can also be programmed to blank its 1 PPS pulse if no UTC fix is
> possible.
>
> No RAIM algoritm can eliminate a bad satellite unless several are being
> tracked. So if you are tracking a single satellite in position hold, it
> had better be good.
>
> Robin Giffard,
> HP Labs.

13. External Antenna for Garmon GPS12

From: "Victor A. Kean, Jr." <vkean@ds.net>
Date: Mon, 14 Sep 1998 23:56:39 -0400
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <01BDE03B.517905A0@desk.k1lt.ampr.org>
Rendered body type: text/plain

Right, the Garmon 12, unlike the 12XL, doesn't have provisions for an external antenna. Nevertheless, you can use it inside. I do, in my basement. I have on of those hockey puck external antennas, which is outside, on about 20 feet of RG58. The puck receives its power from my Garmon 20. I inserted a BNC T connector into the line between the antenna and the Garmon 20. In the third position on the T connector, I inserted a 1.8 inch wire. When the 1.8 inch wire is taped to the surface of the Garmon 12, I get full scale signals from the satellites that have an unobstructed view of my puck. Thus, I can play GPS with the 12 inside. If this technique were done with attention to impedance matching and antennas more effective than 1/4 wave of #18 wire, perhaps there would be enough signal to get a few inches across the room.

Now I have more incentive to mount the puck on the top of my tower.

Vic, K1LT

14. Re: [TACGPS:1830] Worst Case timing performance of Oncore?

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Tue, 15 Sep 1998 16:11:00 -0400
To: tacgps@tapr.org
Message-ID: <35FEC9D4.4B4891CA@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

John Ackermann N8UR wrote:
> Does anyone have a feel for what the worst-case PPS performance of a 6
> channel Oncore (the old style unit) would be? I'm interested in knowing
> whether the worst case is still better than 1 microsecond, whether it
> could be as much as a few milliseconds, or if it's somewhere in between,
> just where that might be.

You got several other answers, I'll speak from my experience
with 50+ 6-channel units around the world. First, let me presume
that the receivers have version 5.x or greater firmware. The
original PVT-6 performance before Version 5 was disappointing,
and pre-5.0 receivers had a ~600 nsec timing bias in them.

My first answer is that I have NEVER seen a receiver that was
tracking satellites have an error more than one usec. If it
loses all satellites, then the pulse drifts off slowly,
depending on the internal xtal in the rcvr. This might give
rise to a 1 msec error after ~1 hour.

I presume you are asking in the context of your LINUX xntpd
effort. Let me offer a caveat: The "stock" GPS xntpd uses the
time in the $GPGGA message, but the GGA time is the time of
the LAST VALID POSITION FIX. Therefore in zero-D mode, or if
the receiver is unlocked and "coasting", the GGA HHMMSS field
is not updated at all. This is the reason I strongly recommend
that the xntpd code must be modified to handle the $GPZDA
message which has the CURRENT UTC time, regardless of the
zero-D or "coasting".

Jim's posting of the note from Robin Giffard has some good
info in it. The TRAIM option in the newer receivers virtually
guarantees the integrity of the timing. The TRAIM code in
the receivers lets you select the option of disabling the 1PPS
output if TRAIM decides the timing is bogus. AFAIK, TRAIM was
never included in any of the 6-channel receivers like you
mentioned. Robin said that TRAIM was in the UT -- I believe
that the original UT lacked TRAIM, but it is in the newer UT+
and it is also in the newer VP ONCORE receivers.

Basically, TRAIM for timing says "OK -- I only need one
satellite for timing. But If I have three in lock, and one is
bad, I know which two are good." [Extend this to more than
three and you have not only a good/bad test but also a
way to quantify the "how good?" question as well as an over-
determined timing solution.]

73, Tom

15. Re: [TACGPS:1835] Re: Worst Case timing performance of Oncore?

From: relseth@siosolutns.win.net (Raymond A. Elseth)
Date: Wed, 16 Sep 1998 17:03:25
To: tacgps@tapr.org
Message-ID: <190@siosolutns.win.net>
Rendered body type: text/plain

Slightly (but not much) off-topic.....

I have just recieved a CNSClock (very nice piece, BTW). Our
organization has an older RS/6000 running AIX v.3.2.5 (an older
but still supported release of AIX). I would like to set the RS/6000
up as a xntpd server using the CNSClock under AIX, however we are
not strong on AIX/Unix skills. Can anyone point me to a source for a
"compile and go" xntpd module that includes Tom's recommended $GPZDA
mod _and_ will run under AIX v.3.2.5?

RAE

Raymond A. Elseth Internet: relseth@siosolutns.win.net
SIO Solutions CIS UserID: 76137,2426
Palatine, IL Voice: 847/705-9721

16. Re: [TACGPS:1835] Re: Worst Case timing performance of Oncore?

From: John Ackermann N8UR <jra@febo.com>
Date: Wed, 16 Sep 1998 08:09:18 -0400
To: tacgps@tapr.org
Message-ID: <199809161209.IAA16021@meow.febo.com>
Rendered body type: text/plain

In message <35FEC9D4.4B4891CA@tomcat.gsfc.nasa.gov>, "Dr Thomas A Clark (W3IWI)
" writes:
>My first answer is that I have NEVER seen a receiver that was
>tracking satellites have an error more than one usec. If it
>loses all satellites, then the pulse drifts off slowly,
>depending on the internal xtal in the rcvr. This might give
>rise to a 1 msec error after ~1 hour.

Thanks! That's what I was looking for.

>I presume you are asking in the context of your LINUX xntpd
>effort. Let me offer a caveat: The "stock" GPS xntpd uses the
>time in the $GPGGA message, but the GGA time is the time of
>the LAST VALID POSITION FIX. Therefore in zero-D mode, or if
>the receiver is unlocked and "coasting", the GGA HHMMSS field
>is not updated at all. This is the reason I strongly recommend
>that the xntpd code must be modified to handle the $GPZDA
>message which has the CURRENT UTC time, regardless of the
>zero-D or "coasting".

I'm using a modified nmea driver that (a) uses the GPZDA sentence, and
(b) uses the PPS signal for its time mark. It's available via my ntp
web page at http://www.febo.com/ntp/ntp.html and seems to work pretty
well.

The problem I'm dealing with is figuring out what the "true" time is from
the various data that xntpd gives me. The output of ntpq -p showing all
the clocks indicates that the GPS clock is usually around 6ms slow, with
the external stratum one servers clustered +/- 10ms or so from that.
The output of ntptime shows various things, none of them well documented,
but leads me to believe that the kernel timekeeping also has an estimated
error that's typically in the range of 12-20ms.

I'm trying to figure out why these values based on the PPS signal aren't
closer to 0, or at least less than 1ms. It seems that if both the kernel
timekeeping, and xntpd, are running from the same PPS signal, the difference
between them should be very small indeed.

Maybe I just haven't a clue how to interpret the results, but I've had
difficulty getting much clarification from the ntp folks.

Thanks again for the info.

73,
John

17. Re: [TACGPS:1837] Re: Worst Case timing performance of Oncore?

From: Terje Mathisen <Terje.Mathisen@hda.hydro.com>
Date: Thu, 17 Sep 1998 15:43:59 +0200
To: tacgps@tapr.org
Message-ID: <3601121F.1B13@hda.hydro.com>
Rendered body type: text/plain

John Ackermann N8UR wrote:
> I'm using a modified nmea driver that (a) uses the GPZDA sentence, and
> (b) uses the PPS signal for its time mark. It's available via my ntp
> web page at http://www.febo.com/ntp/ntp.html and seems to work pretty
> well.

After getting a few pointers from John, I have built an xntpd deamon
using this driver, and it did work as soon as I figured out that my
first serial port was named /dev/ttyS0 by linux.

> The problem I'm dealing with is figuring out what the "true" time is from
> the various data that xntpd gives me. The output of ntpq -p showing all
> the clocks indicates that the GPS clock is usually around 6ms slow, with
> the external stratum one servers clustered +/- 10ms or so from that.
> The output of ntptime shows various things, none of them well documented,
> but leads me to believe that the kernel timekeeping also has an estimated
> error that's typically in the range of 12-20ms.
>
> I'm trying to figure out why these values based on the PPS signal aren't
> closer to 0, or at least less than 1ms. It seems that if both the kernel
> timekeeping, and xntpd, are running from the same PPS signal, the difference
> between them should be very small indeed.

I don't know if this is relevant or not, but I get similar results:

On both unpatched 2.0.31 linux, i.e. without the PPS kit, and with
2.1.73, which I believe include the needed support (?), I get strange
timing results:

The $GPZDA timestamp is about 120ms off, which corresponds well with a
(around) 60-character string at 4800 baud, but I never seem to get
hooked up to the PPS signal:

I have set the GPS_NMEA driver to minpoll 4 (i.e. every 16 seconds), and
it goes into a sawtooth pattern: The offset (relative to a local
TrueTime server, after adding those 120ms back in) drops steadily from
6-7 miliseconds to near zero, over a time of a few minutes, and then
makes an abrupt jump back to around 7 ms. BTW. the reduction in offset
always happens in steps of around 1.1ms!

This sounds like I am not getting the PPS signal, and that the Oncore
has some internal interaction between the GPZDA output and the PPS
generation which cause it to make small time steps until the offset is
too big, whereupon it is janked back.

> Maybe I just haven't a clue how to interpret the results, but I've had
> difficulty getting much clarification from the ntp folks.

I'll try the build a kernel with the PPSkit tomorrow, and see what
happens.

Terje la8nw

PS. The ntp4 source includes a refclock_oncore, written by the dane,
Paul Henning Kemp of FreeBSD note. This version depends on hooking the
PPS signal to a paralell port IRQ line however, which seems rather
wasteful when the serial port already has a couple of interrupt-capable
input pins.

--
- <Terje.Mathisen@hda.hydro.com>
Using self-discipline, see http://www.eiffel.com/discipline
"almost all programming can be viewed as an exercise in caching"

18. Re: [TACGPS:1836] Re: Worst Case timing performance of Oncore?

From: John Ackermann N8UR <jra@febo.com>
Date: Thu, 17 Sep 1998 07:33:37 -0400
To: tacgps@tapr.org
Message-ID: <199809171133.HAA22970@meow.febo.com>
Rendered body type: text/plain

It's not compile and go, but http://www.febo.com/ntp/ntp.html has
instructions and a pointer to a modified version of the nmea driver
that supports the $GPZDA sentence as well as the PPS pulse on the DCD

line.

John N8UR
jra@febo.com

> Slightly (but not much) off-topic.....
>
> I have just recieved a CNSClock (very nice piece, BTW). Our
> organization has an older RS/6000 running AIX v.3.2.5 (an older
> but still supported release of AIX). I would like to set the RS/6000
> up as a xntpd server using the CNSClock under AIX, however we are
> not strong on AIX/Unix skills. Can anyone point me to a source for a
> "compile and go" xntpd module that includes Tom's recommended $GPZDA
> mod _and_ will run under AIX v.3.2.5?
>
> RAE
>
>
> _____
> Raymond A. Elseth Internet: relseth@siosolutns.win.net
> SIO Solutions CIS UserID: 76137,2426
> Palatine, IL Voice: 847/705-9721

19. Re: Worst Case timing performance of Oncore?

From: Reg Clemens <reg@dwf.com>
Date: Thu, 17 Sep 1998 11:41:19 -0600 (MDT)
To: tacgps@tapr.org
Message-ID: <199809171741.LAA28834@clemens.dwf.com>
Rendered body type: text/plain

Just to add to the discussion, I have been playing with the
drivers in NTP myself, and seem to have had better luck.
I have been playing on an old SunOS machine and my Linux Box
with similar results on both.

After a period of time with my hacked (to use $GPZDA) NMEA
driver, the NMEA/ATOM combination get to a point where
ntpdc reports an offset of less than 100us, usually in the
10-20us range.

I have not been comparing these to an outside source, as
Im at the end of a slow line here, although I surly should
be able to see the sorts of offsets being reported if
I give it a shot (this weekend?).

However, the long time to `pull in' and the ugly changes
that I had to make to the ntpv3 sources caused me to look
at the ntpv4 sources.

They are MUCH cleaner, and support the idea that you are
going to send ascii and PPS to one port without any serious
changes.

I found that the NMEA/ATOM combination works there (ntpv4) about as
well as it does on ntpv3, but that the ONCORE driver, which
is really an alpha release works MUCH better. Rather than having
the NMEA driver pull the clock in some distance towards lock
then pass the effort over to the ATOM driver, it does the
whole job. Off the top of my head, I would say that it pulls
in from a several sec offset to 10us in mabe 1/2 hour, probably
less. All of my efforts in the last week have been towards
cleaning this thing up and getting it to work reliably.

Incidently, I have the ONCORE driver set up as was noted in a
note earlier this week to use the T-RAIM stuff (anyone know what
RAIM stands for?) and in addition to the additional accuracy
this should provide, it does cause the PPS to stop if you
pull the antenna cable...

Ill get the changes I am using together and put them out where
others can get to them this weekend, but from my end there
are is still one large open question. Could be part of what
John is seeing.

The above experiments were done on SunOS where there is no
Kernel PLL, and on Linux (2.0.35) with the kernel PLL turned OFF.

If I turn the KERNEL PLL stuff ON in Linux, then instead of
10us mean, 100us max, for the offset from the PPS source, I see

it pull into 10us, then drift back out to 5-8ms where it stays
forever.

I need to put some debug prints in both ntpd and the kernel
to try to see what is wrong when the PLL is engaged, since it
should give better not worse results than when it is off.
Could be an error in ntp or the kernel (since I see two flags on
at once that I am told should never be active at the same time),
or Im told, it could be an inherent scheduling problem in the 2.0.x
linux kernels (Im going to try 2.1.119 the next day or two, and
see what happens (but have to move the PPS stuff there first).

More if anyone is interested.

Reg.Clemens
reg@dwf.com

20. Oncore UT+, 100 pps output

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Thu, 17 Sep 1998 14:36:53 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980917143653.0083f980@appstate.campus.mci.net>
Rendered body type: text/plain

I noticed that the Oncore UT+ has a 1 pps/100 pps feature (tech note 490-1,
www.synergy-gps.com). It seems that 100 pps output would be useful for
xtal/rube steering, as it would increase the GPS-versus-osc measurement
rate by a factor of 100. (The timing accuracy on the 1 pps is listed as
the same as the VP Oncore.)

If the GPS pps output jitter is 30 ns rms, and the measurement has a
resolution of say, 100 ns, the total rms would be about 104 ns [sqrt((30^2
+ 100^2)/N)]. For one second and 1 pps, N is one, but for 100 pps, N is
100, so the total rms jitter is reduced by a factor of 10.

For steering purposes should we be looking at the UT+?

73's
Don, W4DH

21. Re: [TACGPS:1841] Oncore UT+, 100 pps output

From: Tom Van Baak <tvb@veritas.com>
Date: Thu, 17 Sep 1998 15:55:52 -0700
To: tacgps@tapr.org
Cc: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Message-ID: <36019378.913@veritas.com>
Rendered body type: text/plain

Donald E. Haselwood wrote:
>
> I noticed that the Oncore UT+ has a 1 pps/100 pps feature (tech note 490-1,
> www.synergy-gps.com). It seems that 100 pps output would be useful for
> xtal/rube steering, as it would increase the GPS-versus-osc measurement
> rate by a factor of 100. (The timing accuracy on the 1 pps is listed as
> the same as the VP Oncore.)

Yes, it seems tempting, but I think the GPS sample rate is
not really the limiting factor. I would guess a steering
device (such as a TOC) averages the 1 (or 100) PPS GPS
output for three different and independent reasons.

1) The time interval circuit in Brooks' circuit (or Tom's
TOC) has finite resolution. A 10 MHz sample clock gives
you 100 ns of resolution, a 24 MHz clock gives you 40 ns
of resolution, etc. Assuming the sample clock and the
pulse being measured aren't phase locked, averaging N
samples gives you sqrt(N) better resolution.

2) The Oncore needs to create a 1 (or 100) PPS pulse
"on time". Internally it knows when this pulse should occur
to within 1 ns. But the pulse is derived from the on-board
VCO clock which runs slightly under 10 MHz. Thus, regardless
of when the Oncore would like to create the 1 PPS pulse, the
actual pulse will be delivered within a +/- 52 ns band of
the desired value. If one averages for 10s to 100s of
seconds the effect of this 104 ns band is reduced.

3) The final effect is SA and other GPS noise. This results
in a 100 to 200 ns wander of the 1 PPS output from the true

UTC value. So even if one eliminated the jitter errors above
and had a 1 PPS (or 100 PPS) accurate to 1 ns, the pulses
would still be subject to SA and wander by at least 100 ns
over the duration of an hour. If one averages the 1 PPS
output for several hours the effect of SA is reduced.

> If the GPS pps output jitter is 30 ns rms, and the measurement has a
> resolution of say, 100 ns, the total rms would be about 104 ns [sqrt((30^2
> + 100^2)/N)]. For one second and 1 pps, N is one, but for 100 pps, N is
> 100, so the total rms jitter is reduced by a factor of 10.
>
> For steering purposes should we be looking at the UT+?
>
> 73's
> Don, W4DH

It seems to me except for the first few hours, the amount of
steering to a good xtal or Rb is so minimal that having to
average the N PPS signal for 10s or 100s of minutes is not
really a problem. Factor #3 dominates over the effects of
factors #1 and #2.

Tom or Brooks, is this your understanding/experience also?

Does anyone have the UT+ or know if the 100 PPS output has
the same +/- 52 ns jitter as the UT?

Thanks,
/tvb

22. Re: [TACGPS:1840] Re: Worst Case timing performance of Oncore?

From: clark@tomcat.gsfc.nasa.gov (Tom Clark -- W3IWI)
Date: Thu, 17 Sep 98 19:45:56 UTC
To: tacgps@tapr.org
Message-ID: <71459@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

RAIM = Redundant Autonomous Integrity Monitor

Tom

23. Does GPS25 have raw measurement output?

From: Utaro Fujioka <ufujioka@mb.infoweb.ne.jp>
Date: Sat, 19 Sep 1998 01:32:20 +0900
To: tacgps@tapr.org
Message-ID: <36028B14.EFA6AF43@mb.infoweb.ne.jp>
Rendered body type: text/plain

Does GPS 25 (from TAPR) have raw measurement output?
GARMIN GPS 25 LP series seems to have raw measurement output.

UTARO

24. Re: [TACGPS:1844] Does GPS25 have raw measurement output?

From: Dave Martindale <davem@cs.ubc.ca>
Date: Fri, 18 Sep 1998 10:02:38 -0700
To: tacgps@tapr.org
Message-ID: <l03130300b22840e3893d@[198.162.38.159]>
Rendered body type: text/plain

>Does GPS 25 (from TAPR) have raw measurement output?
>GARMIN GPS 25 LP series seems to have raw measurement output.

>From discussions with Garmin, I believe that all GPS 25 models have always
had the capability to output raw data on their second serial port,
while continuing to output NMEA on the main serial port.

Older GPS 25s did not have this turned on by default; you had to run a
piece of DOS code supplied by Garmin to download some extra stuff into
the unit to enable raw data out. From then on, it was permanently
turned on. The GPS 35 and 36, which are just a 25 in a housing, couldn't
be used for this because they didn't bring out wires connected to the
second serial port.

But newer GPS 25's all have the raw output firmware installed, and the
raw data can be turned on and off at will be sending the unit a particular
NMEA configuration command on the main serial port. You can also change
the NMEA update rate on these units.

>From looking at Garmin's web site, they now say that the GPS 35 support
raw output as well, so I assume that new 35s also have the extra wires
needed to access the second serial output.

On top of all this, I get the impression that the GPS 25 LP is in fact
the only "GPS 25" currently in production, so if you buy one from
TAPR now it will probably be a 25 LP anyway. There are still multiple
versions of the 25 LP, depending on whether they have a switching
regulator on board and whether the inputs and outputs are CMOS or
RS-232 levels, but they all have the same firmware.

        Dave

25. Re: Worst Case timing performance of Oncore?

From: Reg Clemens <reg@dwf.com>
Date: Sun, 20 Sep 1998 14:46:37 -0600 (MDT)
To: tacgps@tapr.org
Message-ID: <199809202046.OAA29585@clemens.dwf.com>
Rendered body type: text/plain

On Sep 16 21:38 jra@febo.com said

> In message <199809161209.IAA16021@meow.febo.com>, John Ackermann N8UR writes:
>
> The problem I'm dealing with is figuring out what the "true" time is from
> the various data that xntpd gives me. The output of ntpq -p showing all
> the clocks indicates that the GPS clock is usually around 6ms slow, with
> the external stratum one servers clustered +/- 10ms or so from that.
> The output of ntptime shows various things, none of them well documented,
> but leads me to believe that the kernel timekeeping also has an estimated
> error that's typically in the range of 12-20ms.
>
> I'm trying to figure out why these values based on the PPS signal aren't
> closer to 0, or at least less than 1ms. It seems that if both the kernel
> timekeeping, and xntpd, are running from the same PPS signal, the difference
> between them should be very small indeed.
>

and In message <3601121F.1B13@hda.hydro.com>, Terje Mathisen writes

> On both unpatched 2.0.31 linux, i.e. without the PPS kit, and with
> 2.1.73, which I believe include the needed support (?), I get strange
> timing results:
>
> The $GPZDA timestamp is about 120ms off, which corresponds well with a
> (around) 60-character string at 4800 baud, but I never seem to get
> hooked up to the PPS signal:
>
> I have set the GPS_NMEA driver to minpoll 4 (i.e. every 16 seconds), and
> it goes into a sawtooth pattern: The offset (relative to a local
> TrueTime server, after adding those 120ms back in) drops steadily from
> 6-7 miliseconds to near zero, over a time of a few minutes, and then
> makes an abrupt jump back to around 7 ms. BTW. the reduction in offset
> always happens in steps of around 1.1ms!
>

These two messages got me worrying about just what my offsets were,- since Im
doing this at home Im at the end of a 28.8 line, and I hadnt tried any experiments
connecting out the the `real' world, but heres what I saw Sunday Afternoon

After 5min

```
ntpdc> dmpeers
     remote           local      st poll reach  delay   offset    disp
==============================================================================
 LOCAL(0)        0.0.0.0          8   64   17 0.00000  0.000000 16.0000
 clock.llnl.gov  204.134.2.1      1   64   17 0.19147 -0.017913 0.93822
 mustang.plk.af. 204.134.2.1      2   64   17 0.26848 -0.031604 0.93817
 GPS_ONCORE(0)   0.0.0.0          0   64    7 0.00000 -0.004757 1.93800
```

After 15min

```
ntpdc> dmpeers
     remote           local      st poll reach  delay   offset    disp
==============================================================================
 LOCAL(0)        0.0.0.0          8   64  377 0.00000  0.000000 16.0000
.clock.llnl.gov  204.134.2.1      1   64  377 0.18581 -0.007382 0.00307
.mustang.plk.af. 204.134.2.1      2   64  377 0.26625 -0.024799 0.00447
```

```
*GPS_ONCORE(0)   0.0.0.0          0   64  376 0.00000 -0.000146 0.00098

after 1hr

ntpdc> dmpeers
     remote           local      st poll reach  delay   offset    disp
==============================================================================
 LOCAL(0)        0.0.0.0          8   64  377 0.00000  0.000000 16.0000
.clock.llnl.gov  204.134.2.1      1   64  377 0.18460 -0.010478 0.00105
.mustang.plk.af. 204.134.2.1      2   64  377 0.26488 -0.022540 0.00096
*GPS_ONCORE(0)   0.0.0.0          0   64  377 0.00000  0.000096 0.00095

So my greatest fear, that I would end up having the ms or us right, but
have the second wrong is not founded.

After an hour (this is on SunOS, my linux box is w/o its ethernet adaptor
for a week) the offset from the PPS signal is on the order of 100us, and
I appear to have offsets of the oposite sign of 10-20ms to the two external
sources (but with the delays being in the 200ms range, and both being
10-15 hops away, I guess Im not suprised).  At the moment my Linux box
(Kernel PLL off) is showing 40-200us offsets depending on when I look at it.

Terje Said:

> I'll try the build a kernel with the PPSkit tomorrow, and see what
> happens.

Be sure to blow away the config file that NTP built and reconfigure or it
wont notice that that you have installed the PPSKit routines (Im not sure
if just reconfiguring will notice,- blowing away the old file will definately
have it looking again.

AND Ive found its worth the effort to always LOOK at config.h after its
been built and check all the things with PLL or PPS in their name and see
that they appear to be set correctly,- on my system they definately werent
and I had to set things by hand...

I want to try a 2.1.x Linux kernel with this stuff, but it looks like most
(all) of the PPS stuff is still missing over there, so it would take longer
than I have this weekend to integrate the changes.

John said:

> Maybe I just haven't a clue how to interpret the results, but I've had
> difficulty getting much clarification from the ntp folks.

Amen.

Ive got some good suggestions from email to Mills and Ulrich.Windl (who
wrote PPSKit and seems to have integrated the PPS stuff and some of the
PLL stuff into the Linux Kernel), but it always seems to take putting
in my OWN debug statements, since whats there is not documented well enough
for someone other than the writer of the code to understand.


                                        Reg.Clemens
                                        reg@dwf.com
```

26. gps ant.

```
From: shelden3@ionet.net
Date: Sun, 20 Sep 1998 17:55:26 -0500 (CDT)
To: tacgps@tapr.org
Message-ID: <199809202255.RAA11021@mail.ionet.net>
Rendered body type: text/plain
```

I just recently purchased a Motorola Oncore VP. Does anyone know of
any webpages that have some plans for building GPS antenna's? Also does
anyone know if the oncore will work with a passive antenna?

I built a "patch" antenna but I can't see any birds, even after leaving the
program running for 1 hour or more.

Thanks in advance for any information anyone may have.

                                Charlie, KC5NBH
                                http://borg.rass.org

By the way the GPS will be used with APRS on a upcoming balloon launch.

27. Re: [TACGPS:1847] gps ant.

From: Robert Winingham <kc5ejk@onramp.net>
Date: Sun, 20 Sep 1998 23:50:56 -0600
To: tacgps@tapr.org
Cc: shelden3@ionet.net
Message-ID: <v03102801b22b9637403d@[206.50.200.243]>
Rendered body type: text/plain

>   I just recently purchased a Motorola Oncore VP. Does anyone know of
>any webpages that have some plans for building GPS antenna's? Also does
>anyone know if the oncore will work with a passive antenna?
>
>I built a "patch" antenna but I can't see any birds, even after leaving the
>program running for 1 hour or more.
>
>Thanks in advance for any information anyone may have.
>
>   Charlie, KC5NBH
>   http://borg.rass.org
>
>By the way the GPS will be used with APRS on a upcoming balloon launch.

Try running TAC32 software to see what you can see as the
Motorola Oncore OPTICAL port sometimes does not work. :-)

Best to set up the unit with a know good working Ant. I used the Ant. from
my Garmin-45, which is a passive Ant, for my first test.

Fry's , West Marine and TAPR have low cost Active ants and are worth
the price.

TAC32 and SAwatch will help you when testing different ant designs.

As you have APRS get the SIGPLOT.BAS program (part of DOS APRS)
to plot the antenna performance.

- The North Texas Balloon group has tried Tripmates and a Garmin-45.
I wish they would use a Motorola Oncore VP. ----

73

Bob - Dallas,TX --- kc5ejk@onramp.net or kc5ejk@amsat.org ---

28. 1998 ARRL and TAPR DCC this coming weekend !

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Tue, 22 Sep 1998 17:41:08 -0500
To: "TAPR-BB list   mailing"<tapr-bb@tapr.org>
Cc: "HF SIG list   mailing"<hfsig@tapr.org>, " Spread Spectrum "<ss@tapr.org>,
        " TAPR/AMSAT DSP "<dsp@tapr.org>,
        "APRS SIG list   mailing"<aprssig@tapr.org>,
        "NETSIG list   mailing"<netsig@tapr.org>,
        "BBS SIG list   mailing"<bbssig@tapr.org>,
        " tacgps "<tacgps@tapr.org>, aprsnews, mic-e,
        TAPR Regional Freq <regional_freq@tapr.org>
Message-ID: <v04011717b22dd78686a9@[128.83.74.103]>
Rendered body type: text/plain

Just as a reminder the 1998 ARRL and TAPR Digital Communications Conference
in Chicago, IL is happening this weekend!

The conference schedule and information is on-line at http://www.tapr.org/dcc
The abstract page should be on-line shortly.

Hope to see you in Chicago this weekend!

Cheers - Greg Jones, WD5IVD

Greg Jones, WD5IVD   Austin, Texas
wd5ivd@tapr.org   http://www.tapr.org/~wd5ivd

29. SA Watch/Nova

From: "Charles E. Heisler" <cheisler@cyberia.com>
Date: Thu, 24 Sep 1998 21:00:44 -0400
To: tacgps@tapr.org
Message-ID: <199809250228.6375200@cyberia.com>

Rendered body type: text/plain

Has any body else compared the GPS Sat. locations that
 SA Watch reports with where Nova calculates them to be? They don't
 agree for me by a bunch. (bunch= hi tech word meaning too much.) And
 yes, the computer time is correct and the Keps. are up to date etc.

        Charlie
         K3VDB

30. Re: Oncore, PPS, Time etc

From: Terje Mathisen <Terje.Mathisen@hda.hydro.com>
Date: Fri, 25 Sep 1998 08:57:10 +0200
To: Robert Dal Santo <robert@psy.uq.edu.au>
Cc: tacgps@tapr.org
Message-ID: <360B3EC6.1FF2@hda.hydro.com>
Rendered body type: text/plain

Robert Dal Santo wrote:
>
>   Hi, Saw your posting about the accuracy of the PPS on Oncores versus
> others. I am looking at building a GPS clock board to link to a FreeBSD box
> vix PPS on the DCD line and either NMEA or Motoroloa's "binary" prorotcol.
>
>   I'd be very interested in how you go when you get the Oncore connected.

I got everything working at the office yesterday (after lots of help
from Ulrich Windl and Reg Clemens), and did some 'ntpq -p <servername>'
checks from home.

I have had to leave the antenna indoors, facing northwest into a
cliff-face, so it is _very_ suboptimal, but I still get up to 7
connected sats at some times. :-)

Normally it is more like 1-4, so the Oncore looses lock once or twice
every hour or so.

When properly connected, I've seen very good timing performance, running
Linux 2.0.35 using Ulrich Windl's PPSkit-0.3.7.tar.gz.

I have the PPS signal attached to the Carrier Detect line on the serial
port of a very old Dell 486-66 machine (i.e. no RDTSC-based ultra-high
resolution timestamps), but this is still good enough that I've seen the
offset settle down below 20 microsecs, with dispersion near zero.

> have you considered other GPS receivers like the Garmin GPS-25?

Yeah, I just decided that if I was going to solder up a kit, I'd like to
know that I had the best possible reference source, short of a private
UTC atomic clock. :-)

For a 'production' setup, I'd probably use either the ready-made CNS
clock, or one of the special timing receivers, which has the GPS engine
embedded in the antenna enclosure, and with just a serial connection to
the PC.

>   Hopefully I'll be trying NTP with driver 20 (generic NMEA) or driver 30
> (Poul-Henning Kamp's ONCORE driver) in the next month or so :)

I tried the GPZDA-modified NMEA driver first, but now I'm using phk's
very nice Oncore, which uses Motorola binary protocol.

It seems like phk have done a very good job on FreeBSD timing, using his
OS and Oncore driver should get you as close as possible to UTC on a
very limited budget. :-)

Terje

--
- <Terje.Mathisen@hda.hydro.com>
Using self-discipline, see http://www.eiffel.com/discipline
"almost all programming can be viewed as an exercise in caching"

31. Re: TACGPS digest 329 > Rcvr Vs. Nova

From: Pat Kilroy <pat.kilroy@gsfc.nasa.gov>
Date: Fri, 25 Sep 1998 10:21:20 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19980925102120.00854100@pop700.gsfc.nasa.gov>
Rendered body type: text/plain

At 08:11 PM 9/24/98 -0500, tacgps@tapr.org wrote:
> TACGPS Digest 329

>From: "Charles E. Heisler" <cheisler@cyberia.com>
>Subject: SA Watch/Nova
>
> Has any body else compared the GPS Sat. locations that
> SA Watch reports with where Nova calculates them to be? They don't
> agree for me by a bunch. (bunch= hi tech word meaning too much.) And
> yes, the computer time is correct and the Keps. are up to date etc.

Hi Charlie,

For a referee, I'd use the GPS receiver itself to say
where the satellites are. That is, if you are using a
receiver with an LCD.

But then again, doesn't SAWatch use the *receiver* data
to provide the position info? You make the call.

Pat WD8LAQ
Greenbelt

32. DGPS Experimental License

From: "Pete Prossen" <prossen@znet.com>
Date: Sat, 26 Sep 1998 09:11:49 -0700
To: "Tapr GPS list server" <tacgps@tapr.org>
Message-ID: <199809261646.JAA14994@sd.znet.com>
Rendered body type: text/plain

Last month, the FCC (Office of Engineering and Technology
Experimental Branch) granted an experimental license to
Lockheed Martin Corp for the creation of a local differential
GPS system. The experimental call sign, WA2XTC, allocates
two repeater pairs (464.5 & 469.5 and 464.55 & 469.55)
for mobil use in the continental US.

Since DGPS is a burning interest of mine, I would like to know
more about this application. Anyone out there know?

Regards

Pete Prossen
WA6ZUH

33. Re: [TACGPS:1850] SA Watch/Nova

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Sat, 26 Sep 1998 20:43:04 +0000
To: tacgps@tapr.org
Message-ID: <360D51D8.FB72CB02@clark.net>
Rendered body type: text/plain

Charlie, K3VDB wrote:
>
> Has any body else compared the GPS Sat. locations that
> SA Watch reports with where Nova calculates them to be? They don't
> agree for me by a bunch. (bunch= hi tech word meaning too much.) And
> yes, the computer time is correct and the Keps. are up to date etc.

SA Watch, TAC32, Showtime etc all pick up their az/el data from the GPS
rcvr's RS232 output data. None of them have any orbital computations built
in. Your GPS receiver computes the az/el from the latest almanac data it
has
(typically only a few hours old). If it made the geometric calculations
wrong, it would not work as a GPS rcvr! So trust it to be correct.

Perhaps the problem is in the mapping of international GPS satellite ID
(like GPS35) assigned at the time of launch into the PRN code it is
transmitting (like PRN03) that is the ID by which your GPS rcvr (and
hence SA Watch etc knows it)?

Tom

October 1998

Original source file: tacgps.9810
Source: http://ftp.tapr.org/product_docs/TAC2/mail_archives/tacgps.9810

1. Leap Second Pending

```
From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Thu, 01 Oct 1998 11:44:10 -0400
To: TACGPS Mailing List <tacgps@tapr.org>
Message-ID: <3613A349.552D40EE@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain
```

There was some erroneous info going around that there was to be
a leap second on Oct.1 -- this is/was incorrect info -- the next
leap second will be 1999.0 (i.e. Dec.31 '98 with an added
second named 23:59:60).

To explain what leap seconds are all about, the following is
taken from ftp://hpiers.obspm.fr/iers/bul/bulc/BULLETINC.GUIDE:
> UTC is defined by the CCIR Recommendation 460-4 (1986). It
> differs from TAI by an integral number of seconds, in such a way that
> UT1-UTC stays smaller than 0.9s in absolute value. The decision to
> introduce a leap second in UTC to meet this condition is the
> responsability of the IERS. According to the CCIR Recommendation, first
> preference is given to the opportunities at the end of December and
> June,and second preference to those at the end of March and September.
> Since the system was introduced in 1972 only dates in June and
> December have been used.

Since 1972, Leap Seconds have been added on these dates, on average
18 months apart:
 1972 JUL 1
 1973 JAN 1
 1974 JAN 1
 1975 JAN 1
 1976 JAN 1
 1977 JAN 1
 1978 JAN 1
 1979 JAN 1
 1980 JAN 1 -- GPS-UTC= 0 sec
(1980 JAN 6 -- Zero-point for GPS time -- GPS-UTC == 0 sec)
 1981 JUL 1 -- GPS-UTC= 1 sec
 1982 JUL 1 -- GPS-UTC= 2 sec
 1983 JUL 1 -- GPS-UTC= 3 sec
 1985 JUL 1 -- GPS-UTC= 4 sec
 1988 JAN 1 -- GPS-UTC= 5 sec
 1990 JAN 1 -- GPS-UTC= 6 sec
 1991 JAN 1 -- GPS-UTC= 7 sec
 1992 JUL 1 -- GPS-UTC= 8 sec
 1993 JUL 1 -- GPS-UTC= 9 sec
 1994 JUL 1 -- GPS-UTC= 10 sec
 1996 JAN 1 -- GPS-UTC= 11 sec
 1997 JUL 1 -- GPS-UTC= 12 sec
 1999 JAN 1 -- GPS-UTC= 13 sec

The reason for Leap Seconds is that the RATE of UTC is defined as the
same as AT, i.e. defined by atomic frequency standards (specifically
the ~9.2 GHz Cesium hyperfine resonance).

But the earth does not rotate at a "perfect" (i.e. atomic) speed --
the length of a day is influenced by tidal drag from the moon orbiting
the earth (over time scales like millenia), changes in the rotation
properties of the molten core of the earth (over decadal time scales),
seasonal re-distribution of mass on the surface of the earth (like
snow/ice cover, soil moisture, etc), and the angular momentum
associated with atmospheric winds and ocean tides (and some other
smaller effects).

All these geophysical effects (except for tidal dissipation) come
about because the rotating earth system must conserve angular momentum.
As the winds speed up, the earth slows down (and the same applies to
the other effects I listed). As a recent example, last winter's El
Nino caused the length of day to increase by ~600 usec/day for ~100
days. By July 1 '98, this summer's La Nina speeded up the earth by
~500 usec/day from the nominal value -- i.e. a change from last winter
to this summer of about 1 msec/day!

Both our human existence (making the sun be overhead at local noon)

and scientific studies (testing ocean and atmosphere models) requires
us to keep time related to the real rotation of the earth -- UT1
[my group here at NASA specializes in this type of research -- see
http://lupus.gsfc.nasa.gov and http://cddisa.gsfc.nasa.gov for some
more details. We are now able to measure the length of a day to a few
usec, and to do this with ~1 hour time resolution using radio telescopes
observing quasars at the far fringes of the universe.].

AT and GPS time keep an unbroken record of time with no discontinuities.
UT1 follows the minute vagaries of the rotation of the earth,
irrespective of AT. UTC provides the bridge between AT & UT1 by
defining a clock that runs at the atomic time rate, and which has
discrete jumps to keep within ~1 second of the wanderings of the earth.

73, Tom

2. PBS Special

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Mon, 5 Oct 1998 10:45:37 -0400
To: "TAC-2 mail list" <tacgps@tapr.org>
Message-ID: <000001bdf06e$d1162480$331e5c18@john.tampabay.rr.com>
Rendered body type: text/plain

Tomorrow (Tuesday) at 8 PM PBS will air a special "Nova": "Lost at Sea: The
Search for Longitude" based on Dava Sobel's excellent book "Longitude" which
most of us have read. Time well spent.

73 John W4SF

3. Re: [TACGPS:1855] Leap Second Pending

From: Reg Clemens <reg@dwf.com>
Date: Mon, 12 Oct 1998 13:14:58 -0600 (MDT)
To: tacgps@tapr.org
Message-ID: <199810121914.NAA20658@clemens.dwf.com>
Rendered body type: text/plain

I posted this in reply to Tom Clark's posting on 1Oct. I just realized
that I never saw a reflection from the list. Sorry if you see two
copies of this.

Tom:

> There was some erroneous info going around that there was to be
> a leap second on Oct.1 -- this is/was incorrect info -- the next
> leap second will be 1999.0 (i.e. Dec.31 '98 with an added
> second named 23:59:60).

My vague recollection is that they USED to start advertising the leap
second was going to be added by turning on the leap-second indication
less than a month before the time the second would be added (early December
for the December/January second, early June for the June/July second).

The confusion at the moment seems to be partially due to the fact that
the leap-second indication is on now, 3 months ahead of the intended event
and was on most of September, if not earlier.

Any Idea why it was turned on so early? Surly no one needs that much time
to `plan' for the event.

Reg.Clemens
reg@dwf.com

4. Re: [TACGPS:1857] Re: Leap Second Pending

From: Tom Van Baak <tvb@veritas.com>
Date: Mon, 12 Oct 1998 15:07:32 -0700
To: tacgps@tapr.org
Message-ID: <36227DA4.1DAA@veritas.com>
Rendered body type: text/plain

Reg Clemens wrote:

> Tom:
>
> > There was some erroneous info going around that there was to be
> > a leap second on Oct.1 -- this is/was incorrect info -- the next
> > leap second will be 1999.0 (i.e. Dec.31 '98 with an added

> > second named 23:59:60).
>
> My vague recollection is that they USED to start advertising the leap
> second was going to be added by turning on the leap-second indication
> less than a month before the time the second would be added (early December
> for the December/January second, early June for the June/July second).
>
> The confusion at the moment seems to be partially due to the fact that
> the leap-second indication is on now, 3 months ahead of the intended event
> and was on most of September, if not earlier.

Can you explain what you mean by the "indication is now on"?
Do you mean the written announcement has been made? Or that
the next leap second is already in page 18 of subframe 4 of
the GPS signal?

Here also is a recent three minute log of WWVB subcode; the
leap second pending bit is still off and I wouldn't expect
it to turn on until the beginning of December.

1998 281 19:38
201101000200010100120010010002000100010200100100121000000112
1998 281 19:39
201101001200010100120010010002000100010200100100121000000112
1998 281 19:40
210000000200010100120010010002000100010200000100121000000112

> Any Idea why it was turned on so early? Surly no one needs that much time
> to `plan' for the event.
>
>   Reg.Clemens
>   reg@dwf.com

I think an advance notice of several months is not unusual.
Here's a summary of the last three leap second announcements:

USNO announced the 20th leap second (1995-12-31) on August 2, 1995
USNO announced the 21st leap second (1997-06-30) on February 6, 1997
USNO announced the 22nd leap second (1998-12-31) on July 23, 1998

/tvb

5. Re: specs ? Rohde&Schwarz freq.standard

From: peter van daalen <peter@vandaalen.demon.nl>
Date: Tue, 13 Oct 1998 00:15:15 +0100
To: tacgps@tapr.org
Message-ID: <36228D83.81964646@vandaalen.demon.nl>
Rendered body type: text/plain

Hello all,

> Does someone happen to know what are the specs (a.o. short/long
> stability, phase noise) of the
> Rohde & Schwarz frequency standard XSD BN 444114 (0,1-5-10 Mhz , 1 V
> emf , front tweaking dF/F in 1 to 999 ppe11) ?
>
> The vendor (army contractor) assures me that the stability in 10 days
> is better than 2 parts e10 and the 100 days stability better than 2
> parts e11. (specs off the manual (?) which the vendor can't show).
>
> Those specs suggests a rubidium xtal steering. However, the vendor says
> it's - only - chrystal based. Is this possible ? I don't believe so (
> some time

> ago Tom Clark posted some learning on the xtal subject but I lost that
> mail) . I was not allowed to dismantle the case in order to look inside.

> Since this R&S standard is avaliable out here (Holland) it would cost
> me less than importing an Efratom Rubidium standard ex. US (no shipping
> to Europe, no import duties/Vat etc.).
>
> I want to buy this R&S but I don't dare without reliable information.
>
> Who can help me ? Thanks very much
>
> Peter PE1ECM.

6. Re: [TACGPS:1859] Re: specs ? Rohde&Schwarz freq.standard

From: Brooks Shera <ebs@lanl.gov>
Date: Mon, 12 Oct 1998 18:18:20 -0600
To: <tacgps@tapr.org>
Message-ID: <199810130017.SAA14174@lawyer.lanl.gov>
Rendered body type: text/plain

Peter wrote...
>> Does someone happen to know what are the specs (a.o. short/long
>> stability, phase noise) of the
>> Rohde & Schwarz frequency standard XSD BN 444114 (0,1-5-10 Mhz , 1 V
>> emf , front tweaking dF/F in 1 to 999 ppe11) ?
>>
>> The vendor (army contractor) assures me that the stability in 10 days
>> is better than 2 parts e10 and the 100 days stability better than 2
>> parts e11. (specs off the manual (?) which the vendor can't show).
>>
>> Those specs suggests a rubidium xtal steering. However, the vendor says
>> it's - only - chrystal based. Is this possible ?.....

I don't have the specs on the XSD... but I think the values you quote are
entirely consistent with a good ovenized xtal. For example, the
Austron 1250 spec is 1 part in e10/24hours after 30 days and 5 parts
in e11 after 90 days. In my experience, the Austron and other xtals
exceed these specs. A very good xtal can get to the 1-2 parts in e12
level.
An aging curve for the Austron (which hasn't been updated for a while)
is on my webpage www.rt66.com/~shera

Brooks

7. Re: [TACGPS:1858] Re: Leap Second Pending

From: Reg Clemens <reg@dwf.com>
Date: Mon, 12 Oct 1998 21:58:09 -0600 (MDT)
To: tacgps@tapr.org
Message-ID: <199810130358.VAA04358@clemens.dwf.com>
Rendered body type: text/plain

> Can you explain what you mean by the "indication is now on"?
> Do you mean the written announcement has been made? Or that
> the next leap second is already in page 18 of subframe 4 of
> the GPS signal?
>
Well, since I dont have any reason to believe that the ONCORE is lying
to me, I havent actually gone back to `page 18 of subframe 4' to look
but the ONCORE @@Bj command is a Leap Second Pending Status Message,
and it returns

clemens% grep Bj typescript
ONCORE: Send @@Bj 3
ONCORE: 906292715.924764 >>@@Bj 01

This is from data I saved back on 20 September.

Acording to the ONCORE User's Guide, the one byte message is

                0 - No leap second pending
                1 - Addition of 1 second pending
                2 - Subtraction of 1 second pending

So the above response says +1second is pending.

Looks like GPS and WWVB are updated by different folks at different times.
--
                        Reg.Clemens
                        reg@dwf.com

8. DGPS Error Characteristics

From: Jeff Vollin <barnie@flash.net>
Date: Tue, 13 Oct 1998 21:05:51 -0700
To: tacgps@tapr.org
Message-ID: <3624231C.CBA9467E@flash.net>
Rendered body type: text/plain

I have been gathering data on position error using DGPS and I am
interested in what others
may have found. I assume that the differential operations remove most
or all of the human-
injected (SA) errors leaving true signal-related errors. My setup is:

Oncore VP with TAPR DGPSIB as DGPS reference.
Reference location is the result of 10 separate averages each taken over roughly 1 week each.
Garmin 40 GPS receiver of the RTCM signal on a direct cable to the ONCORE
Update rate of 10 seconds on the RTCM data.
DGPS data gathered by SA Watch at 15 second intervals.
Separate active GPS antennas with nearly horizon-to-horizon visibility.
Antennas separated horizontally by 8.1 m and vertically by 10 m.

I gathered a total of 4096 data points and SA watch reports the 2-sigma (95%) error
radius to be 14 m. The mean position correctly indicates the horizontal separation to better
than 0.1m (resolution limit of SA watch). I plotted the latitude error and the longitude
error separately and they both appear to be gaussian distributions. The GPS40 gives
a 2 sigma error of 50m without the RTCM input.

I then further analyzed just the latitude error by running an FFT. The spectrum is flat from the
lowest frequency of 16 microHz (17 Hrs period) up to .003 Hz (5.3 Min period) where there
appears to be a rolloff at 20 dB/decade. Might this be the Kalman filter cutoff frequency for
a stationary Garmin GPS30?

An autocorrelation function shows the data is correlated out to about 3 min where the correlation
value falls into the general noise level. Is this the Kalman filter again?

I have read many descriptions of the SPS error, with SA of course, but I have found very little
discussion of the errors expected from DGPS. I do not have other receivers to use in place of
the Garmin, so I don't have any other standard for comparison.

Comments, anyone?

Jeff Vollin, KC6WFU

9. Re: [TACGPS:1862] DGPS Error Characteristics

From: Dave Martindale <davem@cs.ubc.ca>
Date: Tue, 13 Oct 1998 22:03:27 -0700
To: tacgps@tapr.org
Message-ID: <l03130301b249db5d196e@[198.162.38.159]>
Rendered body type: text/plain

>I gathered a total of 4096 data points and SA watch reports the 2-sigma
>(95%) error
>radius to be 14 m.

>Comments, anyone?

You would probably find it interesting to compare the 40 to the newer Garmin 12-channel receivers. They seem to be *much* less noisy, a fact which is revealed clearly when SA is off.

I did some tests gathering data for about 1 hour with and without differential corrections using several receivers. The differential correction source is a Canadian Coast Guard beacon transmitter that is only a few km from the receiver, so there should be minimal error due to distance between reference station and observing station.

I tested an GPS 45XL and GPS 20, both older single-channel receivers that are probably the same as your GPS 40. All of the positions reported in that hour were within about a 50x100 m rectangle for the 45XL, and a 30x20 m rectangle for the GPS 20. The standard deviations of latitude and longitude observations were 13 and 10 m for the 45XL, 4.2 and 3.9 m for the 20.

In comparison, for a GPS 12XL, II+, and GPS 25 (12-channel units), all of the positions were within a 10x8 m rectangle for the 12XL and II+, and a 13x6 m rectangle for the 25. Standard deviations were 2.1/1.4 m for the 12XL, 1.6/1.2 m for the II+, and 1.9/1.1 m for the 25. (The plot of the 12XL/II+ data is weird, because latitude and longitude are quantized to 0.001 minute of arc in the NMEA output, so only a few discrete values of

lat and long show up for the entire hour. The 25 has an extra digit of
resolution, so its plot is more reasonable looking and the statistics
probably more meaningful).

In other words, both worst-case and average error was several times
larger for the single-channel receivers than for the 12-channel ones.
I don't know why the 45XL was so much worse than the 20, though.

        Dave

10. Re: [TACGPS:1863] Re: DGPS Error Characteristics

From: Dave Martindale <davem@cs.ubc.ca>
Date: Tue, 13 Oct 1998 22:09:28 -0700
To: tacgps@tapr.org
Message-ID: <l03130302b249e205a9dc@[198.162.38.159]>
Rendered body type: text/plain

At 0:04 -0500 14/10/98, I wrote:
>You would probably find it interesting to compare the 40 to the newer
>Garmin 12-channel receivers. They seem to be *much* less noisy, a
>fact which is revealed clearly when SA is off.

That's not what I meant. I meant "when differential corrections
cancel SA and most other sources of position error as well, you
can see a large difference between the performance of the older
single-channel Garmin receivers and the newer 12-channel ones.

Of course SA isn't the only source of errors that are reduced or
eliminated by differential corrections.

        Dave

11. Re: [TACGPS:1859] Re: specs ? Rohde&Schwarz freq.standard

From: Glenn Little <glittle@awod.com>
Date: Wed, 14 Oct 1998 07:37:51 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.16.19981014073751.3457d6dc@awod.com>
Rendered body type: text/plain

The R&S XUA has an internal freq std. This is a 100 kc crystal oscillator.
 In the manual the following is listed:
Frequency fluctuations due to external influences less than 2 to 8 parts
in 10e8.
Mean day to day frequency drift after a service time of 10 days less than 5
parts in 10e8.
For 100 days less than 2 parts in 10e8.
Warm up period for obtaining an accuracy of better than 1 part in 10e6
approx 60 minutes.

This is a unit that was built in the early 1960's and is all tubes.

At 05:16 PM 10/12/98 -0500, you wrote:
> Hello all,
>
>> Does someone happen to know what are the specs (a.o. short/long
>> stability, phase noise) of the
>> Rohde & Schwarz frequency standard XSD BN 444114 (0,1-5-10 Mhz , 1 V
>> emf , front tweaking dF/F in 1 to 999 ppe11) ?
>>
>> The vendor (army contractor) assures me that the stability in 10 days
>> is better than 2 parts e10 and the 100 days stability better than 2
>> parts e11. (specs off the manual (?) which the vendor can't show).
>>
>> Those specs suggests a rubidium xtal steering. However, the vendor says
>> it's - only - chrystal based. Is this possible ? I don't believe so (
>> some time
>
>> ago Tom Clark posted some learning on the xtal subject but I lost that
>> mail) . I was not allowed to dismantle the case in order to look inside.
>
>> Since this R&S standard is avaliable out here (Holland) it would cost
>> me less than importing an Efratom Rubidium standard ex. US (no shipping
>> to Europe, no import duties/Vat etc.).
>>
>> I want to buy this R&S but I don't dare without reliable information.
>>
>> Who can help me ? Thanks very much
>>
>> Peter PE1ECM.

>
>
>
>

Glenn Little   glittle@awod.com   QCWA LM 28417
Amateur Callsign: WB4UIV   wb4uiv@amsat.org   AMSAT LM 2178
QTH: Goose Creek, SC USA (EM92xx)   ARRL TAPR
---

12. Re: [TACGPS:1862] DGPS Error Characteristics

From: "Steven R. Bible" <srbible@gate.net>
Date: Wed, 14 Oct 1998 19:10:43 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19981014191043.00992c40@pop.gate.net>
Rendered body type: text/plain

Jeff,

Tom Clark, W3IWI had I exchanged many emails on the expected accuracy of the TAPR DGPSIB (for which I am the designer). Besides the errors Differential Corrections remove and the assumptions made in using DGPS, one item of concern using a low cost receiver such as the Oncore, is its crystal oscillator.

I haven't tried it, but Tom suggested making measurements and altering the temperature of the Oncore and note the changes. You might try temperature stablizing your reference station and see what changes you see then. The more expensive commercial DGPS reference stations use a much more accurate crystal oscillator to keep better time. Time is of the essense to DGPS.

Tom also introduced me to Zero-Baseline testing, for which you can see the results of on

   http://www.tapr.org/gps/dgps/

Find the link "Performace" to see SA Watch plots. Zero-Baseline testing is simple in concept, connect the reference station and remote (receiving) receivers on the same antenna using a splitter. These are available commercially (from WR, Inc.

    http://www.fleetpc.com/accessories/accessories.html

)or you might find one on the surplus market. Be careful not to mix the +5V sent up the coax to power the antenna. You need to isolate all but one receiver from doing this.

Then Phil Karn KA9Q thought that multipath might have an input to the errors. So he lent me a choke ring antenna. Alas, the measurement remained the same, thus leading us to the conclusion and theory that the local crystal oscillator is the limiting component in the TAPR DGPS Reference Station.

 - Steve
 (n7hpr@tapr.org)

13. GPS Receiver xtal stability factor: GPS-30

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Wed, 14 Oct 1998 21:27:42 -0400
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19981014212742.0081bce0@appstate.campus.mci.net>
Rendered body type: text/plain

Re: [TACGPS:1866]

>Jeff,
...
>I haven't tried it, but Tom suggested making measurements and altering the
>temperature of the Oncore and note the changes. You might try temperature
>stablizing your reference station and see what changes you see then. The
>more expensive commercial DGPS reference stations use a much more accurate
>crystal oscillator to keep better time. Time is of the essense to DGPS.

Speaking xtal stability (for osc steering), here are a couple of observations & thots:

a) I noticed lately that my GPS-30 (located outside) konks-out early evening (no sats locked). Now with lower humidity, the board temp

"plummets" when the sun drops behind the mtn.

b) I remember plots I made of 3 days-worth of GPS-30 1 pps v Rube showing a roughly 24 hour repetitive pattern. (I need to dig back into that...[when time frees up!].)

The peak-to-peak wasn't big (1-2 us as I remember), but the rate-of-change was worse than Rube specs (hence, a number of days were required if the Rube were to be steered, or a get an Oncore [as Tom recommends]).

c) Looking at a smoked GPS-30 (sigh), I find a DS1620 IC (temp sensor) next to the xtal inside the RF section can. I assume that's where the reported board temp in the RS232 record originates.

Could it be...Garmin attempts some sort of temp correction for xtal drift in the software and if the temp sensor v xtal temps get too far different (rapid temp change) it loses lock on the sats. And,...the 1 pps has a phase error due to temp (hence the daily variation).

For osc steering purposes would be wise to "ovenize" the GPS receiver (regardless of mfg'r)?

73's
Don, W4DH

14. Re: [TACGPS:1867] GPS Receiver xtal stability factor: GPS-30

From: Dave Martindale <davem@cs.ubc.ca>
Date: Wed, 14 Oct 1998 18:54:48 -0700
To: tacgps@tapr.org
Message-ID: <l03130301b24b0528105c@[198.162.38.159]>
Rendered body type: text/plain

>Could it be...Garmin attempts some sort of temp correction for xtal drift
>in the software and if the temp sensor v xtal temps get too far different
>(rapid temp change) it loses lock on the sats. And,...the 1 pps has a
>phase error due to temp (hence the daily variation).

Garmin handhelds use software compensation for oscillator drift; the compensation table is apparently developed during burn-in and updated during normal use. Garmin has said as much in a posting warning people about using the "test" mode in the handhelds in the presence of real satellite signals.

So I wouldn't be surprised to find the same software compensation scheme in the board receivers.

Garmin also warns against fan cooling of the board receivers, because it can cause too rapid temperature change. Again, compensation in software is consistent with this.

Does the Oncore use a TCXO?

By the way, while we're talking about oscillators, anyone know who distributes the Rakon TCXOs, or similar good but cheap oscillators? I'd like to replace the uncompensated 10 MHz oscillator in my frequency counter with something more stable. The counter is capable of resolving 1 part in 1e8, but the oscillator drifts about 1 part in 1e6 during warmup and continues to drift with room temperature changes.

Dave

15. Re: [TACGPS:1867] GPS Receiver xtal stability

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Thu, 15 Oct 1998 03:38:55 +0000
To: tacgps@tapr.org
Message-ID: <36256E4F.AC8AE64E@clark.net>
Rendered body type: text/plain

Steve Bible commented, quoting me:

>I haven't tried it, but Tom suggested making measurements and altering the
>temperature of the Oncore and note the changes. You might try temperature
>stablizing your reference station and see what changes you see then. The
>more expensive commercial DGPS reference stations use a much more accurate
>crystal oscillator to keep better time. Time is of the essense to DGPS.

Let's keep the focus on the topic Steve responded to. He was commenting

on clock performance of the ONCORE when used for DGPS corrections. The
point at issue for DGPS was variations of a few METERS corresponding
to timing wandering at levels of < 10 NANOSECONDS. The issue Don Haselwood
raised subsequently referred to timing at levels ~ 1 MICROSECOND.

When the ONCORE operates in the zero-D mode to make DGPS signals it still
has to calibrate its internal clock. If it is observing N satellites
it produces its estimate of the PR & PRR corrections for all N
satellites, but it has had to use ~(1/N) of the data from each satellite
to calibrate the clock. What this means is that, although the SA
modulation from the satellites are incoherent & uncorrelated, the
PR/PRR for the different satellites data will exhibit a correlation
coefficient of ~(1/N).

My comment to Steve was that the DGPS corrections might be improved if
the ONCORE's internal clock was made better on time scales of ~1 minute
and shorter. This might be accomplished by thermally isolating the DGPSIB
from the outside world. Mine here is wrapped in about 5 layers of "Bubble
Paper" for just this reason.

Steve also mentioned trying a lower multipath choke-ring antenna. FYI,
I now have built a really cheap choke ring antenna using $10 worth of parts
from the local hardware store and one of the Motorola Antenna97 antennas
that TAPR has for sale. As a part of a program I have to do really high
accuracy calibrations of geodetic GPS antennas, I ran my "$50 special"
and it looked really good. Is there any interest?

Don Haselwood then responded with some issues not relevant to the DGPS
accuracy thread, but which I feel compelled to answer:

> Speaking xtal stability (for osc steering), here are a couple of
> observations & thots:
> a) I noticed lately that my GPS-30 (located outside) konks-out early
> evening (no sats locked). Now with lower humidity, the board temp
> "plummets" when the sun drops behind the mtn.

Since the GPS30 is the same receiver as the G-20, I refer you to the
myriad plots of G20 stability in different modes that I have posted
on aleph. The G20 exhibits bizzare, strange jumps of upwards of 1 usec.
IMHO, the G20/30 should NEVER be used for a timing application that
has requirements at the sub-usec level. I have said it before, and
I say it again -- as a timing receiver, the G20/30 works, but it
must be regarded as a toy. If you haven't looked at aleph, the URL is
  ftp://aleph.gsfc.nasa.gov/GPS/totally.accurate.clock/

> b) I remember plots I made of 3 days-worth of GPS-30 1 pps v Rube showing a
> roughly 24 hour repetitive pattern. (I need to dig back into that...[when
> time frees up!].)
>
> The peak-to-peak wasn't big (1-2 us as I remember), but the rate-of-change
> was worse than Rube specs (hence, a number of days were required if the
> Rube were to be steered, or a get an Oncore [as Tom recommends]).

Again, I would suggest that you >>>NEVER<<< use the words "Rube" and
"G20/30"
in the same sentence!

> c) Looking at a smoked GPS-30 (sigh), I find a DS1620 IC (temp sensor) next
> to the xtal inside the RF section can. I assume that's where the reported
> board temp in the RS232 record originates.

Yes, Garmin uses a temperature sensor in all their receivers.

> Could it be...Garmin attempts some sort of temp correction for xtal drift
> in the software and if the temp sensor v xtal temps get too far different
> (rapid temp change) it loses lock on the sats. And,...the 1 pps has a
> phase error due to temp (hence the daily variation).
>
> For osc steering purposes would be wise to "ovenize" the GPS receiver
> (regardless of mfg'r)?

Since I was so disparaging of the G20/30, let me again point out that, at
levels ~20-30 NANOSECONDS, the ONCORE can be trusted to be a good timing
engine, without the need to resort to ovenizing. Just take a look at the
various ONCORE vs Hydrogen Maser or Cesium plots that have been on aleph
for a couple of years now -- and most of them were taken with the older
6-channel "PVT-6" flavor of the ONCORE.

Then Dave Martindale added:
> Does the Oncore use a TCXO?

Yes, it is a TCXO. It runs at 9.54*2 = 19.08 MHz and can be seen by
popping the shield lids on your ONCORE. The 9.54 MHz frequency is what
is clocked out to give the 1 PPS signal, which is the reason that the
ONCORE 1PPS has a few second sawtooth behavior with +/- 52 nsec
range (104 nsec peak-to-peak = 1/9.54 MHz).

> By the way, while we're talking about oscillators, anyone know who
> distributes the Rakon TCXOs, or similar good but cheap oscillators?
> I'd like to replace the uncompensated 10 MHz oscillator in my
> frequency counter with something more stable. The counter is capable
> of resolving 1 part in 1e8, but the oscillator drifts about 1 part
> in 1e6 during warmup and continues to drift with room temperature
> changes.

Rakon is in New Zealand and sells directly. It is their 10 MHz TCVCXO
that is used in my (very slowly evolving) TOC. Their oscillators are among
the best and cost in the $50 range. FYI -- The dual-frequency TurboRogue
that has worked in orbit on the GPSMET experiment for a couple of years
uses the Rakon, and it was Mike Exxner (who designed GPSMET) that put me
onto them. You can see their product line at   http://www.rakon.com

If there are replies, don't expect answers from me for a couple of weeks.
I'm off tomorrow morning to the AMSAT meerting in Vicksburg and fly direct
from there to Groningen in the Netherlands for YAFM (Yet Another F***ing
Meeting).

73, Tom

16. Phase 3D in Maryland

From: Pat Kilroy <pat.kilroy@gsfc.nasa.gov>
Date: Wed, 14 Oct 1998 23:50:46 -0400
To: amsat-dc@amsat.org, garc-bb@garc.gsfc.nasa.gov, tacgps@tapr.org
Cc: simsat@listserv.gsfc.nasa.gov
Message-ID: <3.0.5.32.19981014235046.007b56d0@pop700.gsfc.nasa.gov>
Rendered body type: text/plain

Wednesday, October 14, 1998

Phase 3D in Maryland

The AMSAT P3D spacecraft arrived safe and sound! Preparations
are underway for thermal-vac testing to begin soon at the
Orbital Sciences Corporation complex in Germantown, Maryland.

Come and see!

There are some opportunities to visit the P3D spacecraft. You
must act quickly, however, because the window of opportunity
is narrow! While it is in the thermal-vac test chamber the
spacecraft is not visible.

VISITOR SCHEDULE

First group: Thursday, October 15, 6:30 p.m. EDT.
Second group: Thursday, October 15, 7:30 p.m.
Third group: Sunday, October 18, 2:00 p.m.
Fourth group: Sunday, October 18, 3:00 p.m.

Each group tour will last about 40 minutes, plus or minus
some depending on the number of visitors. The best time is
the soonest! On Sunday some key AMSAT personnel, including
Lou McFadin W5DID, will NOT be present to make your visit
that much more exciting.

LOCATION

Orbital Sciences Corporation ("OSC" or "Orbital")
20301 Century Blvd.
Germantown, MD 20874
Phone: 301-428-6477

Web: http://www.orbital.com/Gtown/docs/defense/facil.htm
http://www.orbital.com/Gtown/docs/defense/facily/map.htm

The Germantown facility is located immediately west of
I-270 about half-way between the Capitol Beltway (I-495)
and Frederick, Maryland (I-70).

DIRECTIONS: From Washington, D.C. take the Capital Beltway
(I-495) to I-270 North. Exit Route 118 West. Go right onto
Aircraft Drive at the first traffic light. Take the first right
at the stop sign onto Century Blvd. Orbital is located to the
right at 20301 Century Blvd. See sign of the OSC Fairchild
Defense Division. Take the second right, into the large parking
lot. (It's the first right after you pass Cloverleaf Center
Drive on your left.) Coordinates are N 39 11.474, W 077 15.832.
Park and proceed on foot to Building 5 on the right to check in
with security.

An escorted group is limited to ten or fewer visitors in the
facility at one time. Legal picture ID is required. The
deadline to process a foreign national visitor authorization
has passed. As time allows, a tour of this OSC complex that
is rich in space history may be conducted during your visit.

Contact me by e-mail <wd8laq@amsat.org> and include your contact
information, callsign, number in party, citizenship of each, and
specify your preferred time if you haven't already. Those who
RSVP will be first in line.

NOTES. Visitors may wish to note that the nozzle, fuel tanks,
some antennas, MLI blankets, and solar array panels have been
left at home in Orlando. The P3D spacecraft will be clearly
visible through cleanroom glass panels. One or more spacecraft
outer surface panels will be removed to display some of the
P3D inner beauty.

Unmoderated talk-in is on 146.955 MHz FM, the Montgomery (County)
Amateur Radio Club repeater, KV3B/R.

The AMSAT-DC mail list will be the forum for most of the
discussion regarding visiting P3D, performing volunteer shift
work during test, running errands, and decoding the spacecraft
telemetry that will be broadcast while in test. You may subscribe
to the AMSAT-DC list for only for the duration of the testing
in Maryland if you wish. See the easy steps to subscribe and
unsubscribe at <http://www.amsat.org/amsat/listserv/menu.html>.

Assisting as a backup to me is Dan Schultz, N8FGV
<n8fgv@amsat.org>, but he is on his way to Vicksburg, Miss. to
attend the AMSAT Space Symposium and Annual Meeting. Dan cannot
check his e-mail remotely on this trip. Send any e-mail
regarding your visit or the upcoming work schedule to me at
<wd8laq@amsat.org>. E-mail is my first, second and third
modes preferred to handle this. The fourth and riskiest is
by phone at 301-286-1984. Thank you for your understanding.

I have an e-mail from N1SS, K3VDB (Group 2), KA1LM, KA2UPW
(6 for Group 3), NB2F (2 for Group 3), KM4ML (3), K9SLQ,
N2AER (3), and WB2TNL. Exact times were not provided to me
by some and therefore a "Group number" (see above, i.e., first
group, second group, etc.) is not assigned. Please advise me
of your day and time. Or just show up on Thursday night and
take the chance.

Details about the schedule for workers as well as the live
telemetry broadcast reception are forthcoming. See bulletin,
"Phase 3D to Visit Maryland", dated October 9, 1998.

Don't forget to visit the AMSAT Phase 3D Lab web site at
<http://www.magicnet.net/~phase3d/>. See some great photos
by Bob Davis KF4KSS, Chuck Green N0ADI, and Rick Leon KA1RHL
while "on the road" in Maryland!

Sincerely,

Pat Kilroy, WD8LAQ
AMSAT Area Coordinator - MDC
NASA-ARRL-AMSAT-TAPR-GARC

==========

```
Patrick L. Kilroy                                          (ex-743)
SSPP Hitchhiker I&T Engineer      Phone:  301-286-1984
NASA Goddard Space Flight Center  Fax:    301-286-1673
Building 5, New Mail Code 568     E-mail: pat.kilroy@gsfc.nasa.gov
Greenbelt, Maryland  20771        Web:    http://sspp.gsfc.nasa.gov
================================================================

   Visit SimSat at http://garc.gsfc.nasa.gov/~simsat/index.html
```

17. Re: [TACGPS:1869] Re: GPS Receiver xtal stability

From: "Ira A. Wilner" <bdcst@vermontel.net>
Date: Thu, 15 Oct 1998 00:04:01 -0400
To: tacgps@tapr.org
Message-ID: <36257431.64666CA4@vermontel.net>
Rendered body type: text/plain

Dr Thomas A Clark (W3IWI) wrote:
> Steve also mentioned trying a lower multipath choke-ring antenna. FYI,
> I now have built a really cheap choke ring antenna using $10 worth of parts
> from the local hardware store and one of the Motorola Antenna97 antennas
> that TAPR has for sale. As a part of a program I have to do really high
> accuracy calibrations of geodetic GPS antennas, I ran my "$50 special"
> and it looked really good. Is there any interest?

Yes! If you're hardware store special isn't too heavy. :-)

--Ira

18. Community Service

From: "Pete Prossen" <prossen@znet.com>
Date: Wed, 14 Oct 1998 20:31:47 -0700
To: "Tapr GPS list server" <tacgps@tapr.org>
Message-ID: <199810150406.VAA14774@sd.znet.com>
Rendered body type: text/plain

Dear Readers

A heated argument has broken out in this rural community between
frustrated, irate homeowners and general aviation pilots who fly out of our
local airpark. At the heart of the matter are allegations of deviations
from the noise-abatement flight pattern and excessive propellor RPM during
takeoff and turnout. I don't know about the pattern, but I can affirm the
propellor noise problem.

A few persons on each side of the argument are still rational and have
proposed some test flights and observations, perhaps with some real-time
data acquisition of position and sound pressure levels.

Here is an opportunity to use amateur radio frequencies to perform
community service work. I can provide differential GPS corrections for the
area so we can track the test planes accurately. If we do a few "reality
check" settings we should also be able to obtain reasonably accurate
altitude measurements along the pattern. We can then correlate the path to
landmarks on the ground, and hopefully corresponding show sound pressure
levels at the critical points.

My question is this: Would APRS be usable for this task? Does it make any
provisions for logging altitude in addition to lat/lon?

I am APRS incompetent, and would appreciate any and all guidance on this
issue before I stick my neck out with an offer of help.

Regards

Pete Prossen
WA6ZUH

19. Re: [TACGPS:1869] Re: GPS Receiver xtal stability

From: "Doug McKinney" <buoy@redshift.com>
Date: Wed, 14 Oct 1998 21:10:43 -0700
To: <tacgps@tapr.org>
Message-ID: <000e01bdf7f1$d39861c0$87c6cccf@buoy.mcktech.com>
Rendered body type: text/plain

-----Original Message-----
From: Dr Thomas A Clark (W3IWI) <tac@clark.net>
To: tacgps@tapr.org <tacgps@tapr.org>
Date: Wednesday, October 14, 1998 8:47 PM

Subject: [TACGPS:1869] Re: GPS Receiver xtal stability

>Steve also mentioned trying a lower multipath choke-ring antenna. FYI,
>I now have built a really cheap choke ring antenna using $10 worth of parts
>from the local hardware store and one of the Motorola Antenna97 antennas
>that TAPR has for sale. As a part of a program I have to do really high
>accuracy calibrations of geodetic GPS antennas, I ran my "$50 special"
>and it looked really good. Is there any interest?

What a silly question! Okay Tom, I AM INTERESTED!!! How do you make a
CHEAP choke ring antenna? I have not considered such a project, because I
didn't understand the what was critical and what was not critical in the
choke ring antenna design and I ASSUMED (mainly do to cost) that the choke
rings designs where hard to duplicate!!
73's
Doug

20. Re: [TACGPS:1872] Community Service

From: Bob Bruninga <bruninga@nadn.navy.mil>
Date: Thu, 15 Oct 1998 00:48:48 -0400 (EDT)
To: tacgps@tapr.org
Message-ID: <Pine.GSO.4.04.9810150043480.29205-100000@arctic>
Rendered body type: text/plain

On Wed, 14 Oct 1998, Pete Prossen wrote:

> local airpark. At the heart of the matter are allegations of deviations
> from the noise-abatement flight pattern and excessive propellor RPM ...
> My question is this: Would APRS be usable for this task? Does it make any
> provisions for logging altitude in addition to lat/lon?

I can speak for APRSdos which will log the posit and altitude if the GGA
sentence is used. But then it lacks course and speed. If you use RMC,
then you get posit, course and speed but no altitude.

If you transmit both, then you will get both in the data log file, but
only the latest one will ever show on the map at any instant. Also,
APRSdos has a 3D display so you can see the airplane height above the
ground map...

Mac/WinAPRS/+SA do similarly and have more detail maps, but require
WIndows laptops..

SImple matter of a modern TNC, a GPS, and a 2 meter HT in the aircraft.

On the ground, a radio, TNC and APRS software running on a PC will do it..

bob

21. Re: [TACGPS:1866] Re: DGPS Error Characteristics

From: Jeff Vollin <barnie@flash.net>
Date: Wed, 14 Oct 1998 22:19:59 -0700
To: tacgps@tapr.org
Message-ID: <362585FF.9F3B6162@flash.net>
Rendered body type: text/plain

I would propose the following experiment: Place the DGPS Ref Station in a
chamber and cycle the temperature with a 1 hour period. Gather error data
from a DGPS receiver connected to the ref station for several hours.
Fourier analyze the error data and look for a 1 hour periodicity in the error.
The amplitude of this should show the sensitivity of the errors to temperature.

The FFT should reject most of the short term noise. Sound reasonable? I will
try
it soon and report results.

Jeff

Steven R. Bible wrote:

> Jeff,
>
> Tom Clark, W3IWI had I exchanged many emails on the expected accuracy of
> the TAPR DGPSIB (for which I am the designer). Besides the errors
> Differential Corrections remove and the assumptions made in using DGPS, one
> item of concern using a low cost receiver such as the Oncore, is its
> crystal oscillator.

> I haven't tried it, but Tom suggested making measurements and altering the
> temperature of the Oncore and note the changes. You might try temperature
> stablizing your reference station and see what changes you see then. The
> more expensive commercial DGPS reference stations use a much more accurate
> crystal oscillator to keep better time. Time is of the essense to DGPS.
>
> Tom also introduced me to Zero-Baseline testing, for which you can see the
> results of on
>
>   http://www.tapr.org/gps/dgps/
>
> Find the link "Performace" to see SA Watch plots. Zero-Baseline testing is
> simple in concept, connect the reference station and remote (receiving)
> receivers on the same antenna using a splitter. These are available
> commercially (from WR, Inc.
>
>   http://www.fleetpc.com/accessories/accessories.html
>
>)or you might find one on the surplus market. Be careful not to mix the
> +5V sent up the coax to power the antenna. You need to isolate all but one
> receiver from doing this.
>
> Then Phil Karn KA9Q thought that multipath might have an input to the
> errors. So he lent me a choke ring antenna. Alas, the measurement
> remained the same, thus leading us to the conclusion and theory that the
> local crystal oscillator is the limiting component in the TAPR DGPS
> Reference Station.
>
> - Steve
> (n7hpr@tapr.org)

22. TAC2 and the Motorola Oncore Remote GPS

From: "Jim Read" <jimread@earthlink.net>
Date: Thu, 15 Oct 1998 18:20:08 -0700
To: <tacgps@tapr.org>
Message-ID: <001201bdf8a3$22614680$b50101c0@jread>
Rendered body type: text/plain

Hello all.
Just a quickie. Has anyone put this GPS/clock combination together before? I have just built the clock
 and thrown the antenna up on the roof. What landmines am I just about to tread on (the two aren't
connected yet while I figure it all out.
Any assistance gratefully received.
Regards.
Jim

23. Oncore VP BBRAM question

From: "M.L. McCauley" <mtech@airmail.net>
Date: Thu, 15 Oct 1998 22:26:37 -0500
To: <tacgps@tapr.org>
Message-ID: <003101bdf8b4$c8e08140$017b7b7b@mike>
Rendered body type: text/plain

I am installing an Oncore VP (hardware REV 1.5, from TAPR) onto a TAC-2
board to replace a Garmin that lightning blew out. I notice that, contrary
to my docs, the VP has a rechargeable battery onboard. I'm wondering...

- Is this onboard battery charged by the +5 that runs the VP, or do I need
to charge it using external power supplied thru the "+BAT" pin via optional
charging components R6 and its LED and 1N4148?

- I assume that this onboard battery takes the place of the optional BBRAM
battery mentioned in the docs and that the external battery should not be
installed...True?

Thanks in advance for the help!

Mike, WB5MYY

24. Re: [TACGPS:1877] Oncore VP BBRAM question

From: "Doug McKinney" <buoy@redshift.com>
Date: Thu, 15 Oct 1998 22:14:26 -0700
To: <tacgps@tapr.org>
Message-ID: <002201bdf8c3$e4d7c8e0$98c6cccf@buoy.mcktech.com>
Rendered body type: text/plain

-----Original Message-----
From: M.L. McCauley <mtech@airmail.net>
To: tacgps@tapr.org <tacgps@tapr.org>
Date: Thursday, October 15, 1998 8:33 PM
Subject: [TACGPS:1877] Oncore VP BBRAM question

>
>I am installing an Oncore VP (hardware REV 1.5, from TAPR) onto a TAC-2
>board to replace a Garmin that lightning blew out. I notice that, contrary
>to my docs, the VP has a rechargeable battery onboard. I'm wondering...
>
>- Is this onboard battery charged by the +5 that runs the VP, or do I need
>to charge it using external power supplied thru the "+BAT" pin via optional
>charging components R6 and its LED and 1N4148?

The onboard battery is charged from the ONCORE when the ONCORE gets power.

>
>- I assume that this onboard battery takes the place of the optional BBRAM
>battery mentioned in the docs and that the external battery should not be
>installed...True?

That is correct.

>
>Thanks in advance for the help!
>
>Mike, WB5MYY
>

73's
Doug
>

25. RE: [TACGPS:1871] Re: GPS Receiver xtal stability

From: "Borcher, David (NG-EX)" <DBorcher@GI.com>
Date: Thu, 15 Oct 1998 10:30:04 -0400
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <01BDF8E5.548BF6E0@htxchng4.gic.gi.com>
Rendered body type: text/plain

Dr Thomas A Clark (W3IWI) wrote:
> Steve also mentioned trying a lower multipath choke-ring antenna. FYI,
> I now have built a really cheap choke ring antenna using $10 worth of parts
> from the local hardware store and one of the Motorola Antenna97 antennas
> that TAPR has for sale. As a part of a program I have to do really high
> accuracy calibrations of geodetic GPS antennas, I ran my "$50 special"
> and it looked really good. Is there any interest?

I am interested - Where can I get more info on the choke-ring antenna?

Dave K7NG

26. Re: Phase 3D in Maryland > Thursday & Followup Bulletin

From: Pat Kilroy <pat.kilroy@gsfc.nasa.gov>
Date: Fri, 16 Oct 1998 16:34:12 -0400
To: BernDavid@aol.com
Cc: APAlpern@aol.com, amsat-dc@amsat.org, garc-bb@garc.gsfc.nasa.gov,
        p3dlab@amsat.org, wb3v@arrl.org, wt3p@arrl.org, n3efn@arrl.org,
        rlindquist@arrl.org, sford@arrl.org, kb1sf@amsat.org, martha@amsat.org,
        tacgps@tapr.org
Message-ID: <3.0.5.32.19981016163412.0080fa00@pop700.gsfc.nasa.gov>
Rendered body type: text/plain

At 07:38 AM 10/16/98 EDT, BernDavid@aol.com wrote:
>My son and I want to thank you for giving us the opportunity
>to visit P3D. My son
>was very enthusiastic about it when we got home last night and
>told Mommy all about it.
>
>73,
>
>David N2AER

Hi David,

You're welcome indeed! Glad to help out.

- Pat WD8LAQ

FOR THOSE WHO MISSED ...   BULLETIN

Friday, October 16, 1998

First P3D Visitors Are Pleased

Last night we had a nice little turn out of folks to visit
the Orbital Sciences complex to see the Phase 3D test
facilities and see the P3D spacecraft in waiting for
the thermal-vac testing.

We have some openings for a visit this Sunday. The third
group will meet at 2 p.m. and the fourth group at 3 p.m.
See the bulletin, "Phase 3D in Maryland", dated Wednesday,
October 14 for directions to OSC and their ground rules.

Currently, there is room for eight more visitors on Sunday
in the Third group and four more in the Fourth group!

Joining David N2AER and his son, Adam, last night were
Dick Rucker KM4ML and his friends Jim Wilcox W3WV and
Les Cramer, Steve Cavallo KB3BWP, Charlie Heisler K3VDB,
Bill Onuska NI3E, and Rick Hambly WB2TNL and friend.

AMSAT members Harold Price NK6K and Chuck Green N0ADI came
into town yesterday to help the Phase 3D Lab team of Lou
McFadin W5DID, Bob Davis KF4KSS and Rick Leon KA1RHL. More
are coming in soon, including the Phase 3D team from
AMSAT-DL (Germany).

If you can be spontaneous this weekend then come join
the fun. Please RSVP to save a spot!

Hope to see you soon!

Sincerely,

Pat WD8LAQ
AMSAT Area Coordinator - MDC
NASA-ARRL-AMSAT-TAPR-GARC

==
Patrick L. Kilroy   (ex-743)
SSPP Hitchhiker I&T Engineer   Phone: 301-286-1984
NASA Goddard Space Flight Center Fax: 301-286-1673
Building 5, New Mail Code 568   E-mail: pat.kilroy@gsfc.nasa.gov
Greenbelt, Maryland 20771   Web: http://sspp.gsfc.nasa.gov
==

   Visit SimSat at http://garc.gsfc.nasa.gov/~simsat/index.html

27. Re: [TACGPS:1863] Re: DGPS Error Characteristics

From: Jeff Vollin <barnie@flash.net>
Date: Sun, 18 Oct 1998 22:25:51 -0700
To: tacgps@tapr.org
Message-ID: <362ACD5E.29E78DD3@flash.net>
Rendered body type: text/plain

I borrowed a 12xl this weekend and repeated my previous experiment. I did
not find the
error nearly as small as Dave did. I had a 2D standard deviation for the
Garmin 40 to be
7.5m and with the Garmin 12XL the standard deviation was 4.9m. I took data
every 15
sec. for 24 hrs. In Dave's case, his DGPS reference was a Coast Guard
station, and in mine
it was the Oncore+DGPSIB. This may be the difference. I have heard of CORS
stations
which provide continuous data on GPS errors. Could this be used to evaluate
the Oncore

ref station? Anyone know how to do this? Has anyone else found similar
results using the
Oncore ref station?

Jeff Vollin

Dave Martindale wrote:

> >I gathered a total of 4096 data points and SA watch reports the 2-sigma
> >(95%) error
> >radius to be 14 m.
>
> >Comments, anyone?
>
> You would probably find it interesting to compare the 40 to the newer
> Garmin 12-channel receivers. They seem to be *much* less noisy, a
> fact which is revealed clearly when SA is off.
>
> I did some tests gathering data for about 1 hour with and without
> differential corrections using several receivers. The differential
> correction source is a Canadian Coast Guard beacon transmitter that
> is only a few km from the receiver, so there should be minimal error
> due to distance between reference station and observing station.
>
> I tested an GPS 45XL and GPS 20, both older single-channel receivers
> that are probably the same as your GPS 40. All of the positions
> reported in that hour were within about a 50x100 m rectangle for the
> 45XL, and a 30x20 m rectangle for the GPS 20. The standard deviations
> of latitude and longitude observations were 13 and 10 m for the 45XL,
> 4.2 and 3.9 m for the 20.
>
> In comparison, for a GPS 12XL, II+, and GPS 25 (12-channel units), all of
> the positions were within a 10x8 m rectangle for the 12XL and II+, and a
> 13x6 m rectangle for the 25. Standard deviations were 2.1/1.4 m for the
> 12XL, 1.6/1.2 m for the II+, and 1.9/1.1 m for the 25. (The plot of the
> 12XL/II+ data is weird, because latitude and longitude are quantized to
> 0.001 minute of arc in the NMEA output, so only a few discrete values of
> lat and long show up for the entire hour. The 25 has an extra digit of
> resolution, so its plot is more reasonable looking and the statistics
> probably more meaningful).
>
> In other words, both worst-case and average error was several times
> larger for the single-channel receivers than for the 12-channel ones.
> I don't know why the 45XL was so much worse than the 20, though.
>
>   Dave

28. need help with Oncore VP problem

From: "M.L. McCauley" <mtech@airmail.net>
Date: Mon, 19 Oct 1998 22:53:37 -0500
To: "TAC/GPS sig" <tacgps@tapr.org>
Message-ID: <000501bdfbdd$38986ea0$017b7b7b@mike>
Rendered body type: text/plain

I have a brand new Oncore VP in a TAC-2 which seems to have either partially
locked up or partially failed. I installed the receiver on a TAC-2 board a
couple of days ago to replace a Garmin that lightning got. The received
started right up no problem and has run connected to an old AT laptop
running SHOWTIME (the computer that runs TAC-32 is on another assignment for
a while), remaining locked 100% of the time.

I noticed a couple of hours ago that SHOWTIME indicated that the receiver
had totally lost lock. I tried to restart SHOWTIME, and then tried the
Oncore utilities and a terminal program; seems that data is going out to the
receiver but nothing is coming back. The receiver has power and the TAC-2 1
PPS LED is blinking.

Ideas?

Thanks in advance!

Mike, WB5MYY

29. Re: [TACGPS:1882] need help with Oncore VP problem

From: "Doug McKinney" <buoy@redshift.com>
Date: Mon, 19 Oct 1998 22:54:52 -0700
To: <tacgps@tapr.org>
Message-ID: <000801bdfbee$2ae23d20$85c6cccf@buoy.mcktech.com>

Rendered body type: text/plain

-----Original Message-----
From: M.L. McCauley <mtech@airmail.net>
To: tacgps@tapr.org <tacgps@tapr.org>
Date: Monday, October 19, 1998 8:58 PM
Subject: [TACGPS:1882] need help with Oncore VP problem

>
>I have a brand new Oncore VP in a TAC-2 which seems to have either
partially
>locked up or partially failed. I installed the receiver on a TAC-2 board a
>couple of days ago to replace a Garmin that lightning got. The received
>started right up no problem and has run connected to an old AT laptop
>running SHOWTIME (the computer that runs TAC-32 is on another assignment
for
>a while), remaining locked 100% of the time.
>
>I noticed a couple of hours ago that SHOWTIME indicated that the receiver
>had totally lost lock. I tried to restart SHOWTIME, and then tried the
>Oncore utilities and a terminal program; seems that data is going out to
the
>receiver but nothing is coming back. The receiver has power and the TAC-2 1
>PPS LED is blinking.
>
>Ideas?
>
>Thanks in advance!
>
>Mike, WB5MYY
>
These are not easy to answer. My first area to look at is the MAX232. If
you have a RS232 tester with indicating LEDs you can verify data to and from
the computer. Well, is the old AT Laptop still functioning? The ONCORE has
very seldom the problem, so assume the ONCORE is good and the laptop or
TAC2 or cable/connector is faulty. I am the person who has designed and
built the ONCORE and GARIN interface boards. So let me know how the hunt
goes!!
73's
Doug KC3RL

30. Re: [TACGPS:1883] Re: need help with Oncore VP problem

From: "M.L. McCauley" <mtech@airmail.net>
Date: Tue, 20 Oct 1998 08:30:40 -0500
To: <tacgps@tapr.org>
Message-ID: <002501bdfc2d$d5383380$017b7b7b@mike>
Rendered body type: text/plain

-----Original Message-----
From: Doug McKinney <buoy@redshift.com>
To: tacgps@tapr.org <tacgps@tapr.org>
Date: Tuesday, October 20, 1998 1:26 AM
Subject: [TACGPS:1883] Re: need help with Oncore VP problem

>
>-----Original Message-----
>From: M.L. McCauley <mtech@airmail.net>
>To: tacgps@tapr.org <tacgps@tapr.org>
>Date: Monday, October 19, 1998 8:58 PM
>Subject: [TACGPS:1882] need help with Oncore VP problem

<SNIP>

>
>Doug KC3RL
>
>

Doug,

Thanks for your offer of help. I haven't had a chance to take the breakout
box or the scope to it yet, but I can tell you that all the ICs on the board
have been replaced. The same hit that got the Garmin took out the MAX232, so
once I determined that I just "shotgunned" everything on the board except
for the 7805 and the diodes, which I checked. Ditto on the MIMIC in my
homebrew patch antenna, which was also smoked.

I'll check it out further and get back to you. Again, thanks!

Mike, WB5MYY

31. Re: [TACGPS:1884] Re: need help with Oncore VP problem

From: "Doug McKinney" <buoy@redshift.com>
Date: Tue, 20 Oct 1998 07:30:01 -0700
To: <tacgps@tapr.org>
Message-ID: <000c01bdfc36$cf761da0$95c6cccf@buoy.mcktech.com>
Rendered body type: text/plain

-----Original Message-----
From: M.L. McCauley <mtech@airmail.net>
To: tacgps@tapr.org <tacgps@tapr.org>
Date: Tuesday, October 20, 1998 6:43 AM
Subject: [TACGPS:1884] Re: need help with Oncore VP problem

>
>-----Original Message-----
>From: Doug McKinney <buoy@redshift.com>
>To: tacgps@tapr.org <tacgps@tapr.org>
>Date: Tuesday, October 20, 1998 1:26 AM
>Subject: [TACGPS:1883] Re: need help with Oncore VP problem
>
>
>>
>>-----Original Message-----
>>From: M.L. McCauley <mtech@airmail.net>
>>To: tacgps@tapr.org <tacgps@tapr.org>
>>Date: Monday, October 19, 1998 8:58 PM
>>Subject: [TACGPS:1882] need help with Oncore VP problem
>>
>>
><SNIP>
>
>
>>
>>Doug KC3RL
>>
>>
>
>Doug,
>
>Thanks for your offer of help. I haven't had a chance to take the breakout
>box or the scope to it yet, but I can tell you that all the ICs on the
board
>have been replaced. The same hit that got the Garmin took out the MAX232,
so
>once I determined that I just "shotgunned" everything on the board except
>for the 7805 and the diodes, which I checked. Ditto on the MIMIC in my
>homebrew patch antenna, which was also smoked.
>
>I'll check it out further and get back to you. Again, thanks!
>
>Mike, WB5MYY
>
 Holy SMOKES!!!
73's
Doug

32. Re: [TACGPS:1882] TACGPS digest 341

From: mpetz@ccm.stlcc.cc.mo.us (Michael Petz)
Date: Wed, 21 Oct 1998 09:06:28 -0500
To: tacgps@tapr.org
Message-ID: <2.2.16.19981021090412.0e0fadf2@ccm.stlcc.cc.mo.us>
Rendered body type: text/plain

I had this happen once. The receiver would not lock even after a reset.
I started to look at the data coming out on the serial port. What I
found was that the GPS clock time had changed and the GPS receiver
was looking for satellites that were not there. I reset the time and the
receiver locked onto the first bird within a minute. The unit aquired 5
satellites within 10 minutes. Check the GPS units time.
                               Michael Petz
                               KA9HNT
                               mpetz@ccm.stlcc.cc.mo.us

At 12:33 AM 10/20/98 -0500, you wrote:

>Date: Mon, 19 Oct 1998 22:53:37 -0500
>From: "M.L. McCauley" <mtech@airmail.net>
>To: "TAC/GPS sig" <tacgps@tapr.org>
>Subject: need help with Oncore VP problem
>Message-ID: <000501bdfbdd$38986ea0$017b7b7b@mike>
>
>
>I have a brand new Oncore VP in a TAC-2 which seems to have either partially
>locked up or partially failed. I installed the receiver on a TAC-2 board a
>couple of days ago to replace a Garmin that lightning got. The received
>started right up no problem and has run connected to an old AT laptop
>running SHOWTIME (the computer that runs TAC-32 is on another assignment for
>a while), remaining locked 100% of the time.
>
>I noticed a couple of hours ago that SHOWTIME indicated that the receiver
>had totally lost lock. I tried to restart SHOWTIME, and then tried the
>Oncore utilities and a terminal program; seems that data is going out to the
>receiver but nothing is coming back. The receiver has power and the TAC-2 1
>PPS LED is blinking.
>
>Ideas?
>
>Thanks in advance!
>
>Mike, WB5MYY
>
>

33. Re: [TACGPS:1883] Re: need help with Oncore VP problem

From: "M.L. McCauley" <mtech@airmail.net>
Date: Fri, 23 Oct 1998 23:17:27 -0500
To: <tacgps@tapr.org>
Message-ID: <000601bdff05$372da6e0$017b7b7b@mike>
Rendered body type: text/plain

>-----Original Message-----
>From: M.L. McCauley <mtech@airmail.net>
>To: tacgps@tapr.org <tacgps@tapr.org>
>Date: Monday, October 19, 1998 8:58 PM
>Subject: [TACGPS:1882] need help with Oncore VP problem
>
>
>>
>>I have a brand new Oncore VP in a TAC-2 which seems to have either
>partially
>>locked up or partially failed. I installed the receiver on a TAC-2 board a
>>couple of days ago to replace a Garmin that lightning got. The received
>>started right up no problem and has run connected to an old AT laptop
>>running SHOWTIME (the computer that runs TAC-32 is on another assignment
>for
>>a while), remaining locked 100% of the time.
>>
>>I noticed a couple of hours ago that SHOWTIME indicated that the receiver
>>had totally lost lock. I tried to restart SHOWTIME, and then tried the
>>Oncore utilities and a terminal program; seems that data is going out to
>the
>>receiver but nothing is coming back. The receiver has power and the TAC-2
1
>>PPS LED is blinking.
>>
>>Ideas?
>>
>>Thanks in advance!
>>
>>Mike, WB5MYY
>>

Doug,

As the old phrase goes, check the simple stuff first. The problem was a
loose connection in the RS-232 cable on the TAC-2 enclosure end. I used a
VERY small 4 pin connector on the enclosure end and a DB-9 on the other. A
wire popped loose from the TX pin on the small connector.

Thanks very much for the offer of help, at any rate.

Have a great weekend!

Mike, WB5MYY

34. Re: [TACGPS:1861] Re: Leap Second Pending

From: "Eric A. Cottrell" <eac@shore.net>
Date: Sat, 24 Oct 1998 18:05:53 -0500
To: tacgps@tapr.org
Message-ID: <36325D51.35E5@shore.net>
Rendered body type: text/plain

Reg Clemens wrote:
> Acording to the ONCORE User's Guide, the one byte message is
>
> 0 - No leap second pending
> 1 - Addition of 1 second pending
> 2 - Subtraction of 1 second pending

Hello,

I seem to remember they always add leap seconds. Have
they ever subtracted one or is it just to be
symetrical?

73 Eric eac@shore.net WB1HBU

35. No 1PPS signal w/Garmin GPS25

From: "Dan Hinz, Jr." <dan.hinz@ieee.org>
Date: Sun, 25 Oct 1998 20:43:11 -0800
To: tacgps@tapr.org
Message-ID: <3633FDDF.DDA1D7CC@ieee.org>
Rendered body type: text/plain

I need some ideas....
I do not get the 1PPS signal out of the TAC card: Stats:

Garmin GPS25-LVS s/w 2.21
I am getting fixes, verified by monitoring the output on the RS-232.
I don't see pulses at the 1PPS line of the TAC card or at the GARMIN
directly.
The assembly went smoothly and all testing passed w/o any difficulty. I
have and LED attached at the header on the TAC card and when I energize
the card, I notice 1 quick flash.

I did remove the GPS receiver, removed the 04's and 132 chips. I waited
about 2X as long as I did previously to track the satellites and still
no pulse on the 1PPS line of the GARMIN. I don't know if I actually
acquired the satellites as I couldn't drive the PC's serial port.

Do I need to enable the 1PPS output? if so, how?
One other question: what program do people use to control the serial
ports in Win95? On my other computer, I boot to DOS and use PROCOMM.
I'd prefer to stay in W95 (as much as I dislike it)
and talk/monitor the serial ports directly.
Thanks & 73,
Dan, W6LSN

36. Re: [TACGPS:1889] No 1PPS signal w/Garmin GPS25

From: Dave Martindale <davem@cs.ubc.ca>
Date: Sun, 25 Oct 1998 21:33:51 -0800
To: tacgps@tapr.org
Message-ID: <l03130300b259b87971dd@[198.162.38.159]>
Rendered body type: text/plain

>Do I need to enable the 1PPS output? if so, how?

Yes, you do. For some reason, the GPS 25 seems to use one channel's worth
of DSP power generating the 1 PPS output. So either you get 12 receiver
channels and no 1PPS (default config) or you get 11 channels plus 1PPS.

Just get the serial port working, then send something like the following
to the receiver. Then power off and back on, and you should have 1 PPS.

$PGRMC,,,,,,,,,,,,2,4,
$PGRMCE

Note that you need to send CR/LF after each line. The "2" in the above

enables the 1 PPS output, and the "4" programs a 100 ms "high" duration
for the 1 PPS output. The PGRMCE command tells the GPS to send you
its current settings, so you can verify that the change happened OK.

All this is explained in the GPS 25 LP manual. It also explains how
to put the GPS in 2D mode (3D is default) with a specified altitude;
this probably increases the accuracy of the 1 PPS output. You can
turn output sentences on and off to get just the ones you want.
And you can enable raw data (pseudorange and phase) on the other
serial port.

        Dave

37. Re: [TACGPS:1890] Re: No 1PPS signal w/Garmin GPS25

From: "Steven R. Bible" <srbible@gate.net>
Date: Mon, 26 Oct 1998 18:31:57 -0500
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19981026183157.00a508c0@pop.gate.net>
Rendered body type: text/plain

Or you can use TAC32 to do all this for you. Info about TAC32 available from

    http://www.tapr.org/tapr/html/tac32.html

- Steve

At 11:39 PM 10/25/98 -0600, you wrote:
>>Do I need to enable the 1PPS output? if so, how?
>
>Yes, you do. For some reason, the GPS 25 seems to use one channel's worth
>of DSP power generating the 1 PPS output. So either you get 12 receiver
>channels and no 1PPS (default config) or you get 11 channels plus 1PPS.
>
>Just get the serial port working, then send something like the following
>to the receiver. Then power off and back on, and you should have 1 PPS.
>
>$PGRMC,,,,,,,,,,,,2,4,
>$PGRMCE
>
>Note that you need to send CR/LF after each line. The "2" in the above
>enables the 1 PPS output, and the "4" programs a 100 ms "high" duration
>for the 1 PPS output. The PGRMCE command tells the GPS to send you
>its current settings, so you can verify that the change happened OK.
>
>All this is explained in the GPS 25 LP manual. It also explains how
>to put the GPS in 2D mode (3D is default) with a specified altitude;
>this probably increases the accuracy of the 1 PPS output. You can
>turn output sentences on and off to get just the ones you want.
>And you can enable raw data (pseudorange and phase) on the other
>serial port.
>
>   Dave
>
>
>
 - Steve
 (n7hpr@tapr.org)

38. Motorola UT+ receivers?

From: Mastenbrook Gary-G13216 <g13216@email1.wes.mot.com>
Date: Tue, 27 Oct 1998 13:06:50 -0600
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <51F347B016ADD011963200805FC145620340E235@email1.wes.mot.com>
Rendered body type: text/plain

I wonder how many of the TAC users are running a UT+ receiver? Also, I
wonder which battery backup people are using for this receiver type?
(I'm putting together a TAC with a UT+ which does not have the on-board
battery on the GPS unit.)
Gary N8DMT

39. Re: [TACGPS:1892] Motorola UT+ receivers?

From: Jim Johnson <jjjohnson@saiph.hpl.hp.com>
Date: Tue, 27 Oct 1998 13:16:02 PST
To: tacgps@tapr.org
Message-ID: <199810272116.NAA00271@saiph.hpl.hp.com>

Rendered body type: text/plain

> I wonder how many of the TAC users are running a UT+ receiver? Also, I
> wonder which battery backup people are using for this receiver type?
> (I'm putting together a TAC with a UT+ which does not have the on-board
> battery on the GPS unit.)
> Gary N8DMT
>
>
Hi Gary,

    I have a UT+ up and running with TAC32 Ver. Beta 13 at the moment,
but I don't have the battery backup connected - sorry I can't be of
help on that one. The Beta 13 works beautifully and the whole rig
makes a very nice timing receiver.

73,

Jim W6SC
jjohnson@hpl.hp.com

40. P3D Thermal-Vac Winding Down

From: Pat Kilroy <pat.kilroy@gsfc.nasa.gov>
Date: Wed, 28 Oct 1998 15:13:21 -0500
To: amsat-dc@amsat.org
Cc: p3dlab@amsat.org, w5did@amsat.org, ghendric@fcc.gov,
        pschmidt@mindspring.com, peter.you@jnt.com, phyoung@erols.com,
        garc-bb@garc.gsfc.nasa.gov, NN0DJ@amsat.org, sford@arrl, n1rl@arrl.org,
        w3abc@arrl.org, wb3v@arrl.org, wt3p@arrl.org, N1SS@aol.com,
        wa4sir@amsat.org, bonuska@CapAccess.org, ka3hdo@amsat.org,
        cavallo.john@orbital.com, tacgps@tapr.org, amsat-bb@amsat.org
Message-ID: <3.0.5.32.19981028151321.008585b0@pop700.gsfc.nasa.gov>
Rendered body type: text/plain

Wednesday, October 28, 1998 @ 1800 UTC

P3D THERMAL-VAC TEST WINDING DOWN

The local P3D TLM "broadcast" is now turned off, according to
Phase 3D Lab Manager Lou McFadin, W5DID, a few moments ago. It
was a good test. Lou was glad to hear that some did indeed copy
it okay! The observed frequency drifting slightly was expected,
due to the large temperature changes in the chamber. In fact,
it would have been a challenge to track of the signals over the
duration of the test, Lou said, because the RUDAK and spacecraft
teams were QSYing around, including many band changes.

Stacey Mills, W4SM, P3D Ground Controller, was very helpful in
explaining to Steve Greene, KA1LM, and Eric Rosenberg, W3DQ, some
of the details of his beta P3D telemetry software. They succeeded
in copying the S7-S9 signals from Northern Virginia and Washington,
D.C. respectively. Thank you, gentlemen!

Thermal-vac stops tonight, with chamber break set for tomorrow
morning.

The volunteer overnight scheduling has stopped. No more shift
work is needed. Thank you to all who rose to the occasion to
cover the wee hours, and often multiple shifts! By name: Perry
Klein W3PK, Dan Schultz N8FGV, Bill Onuska NI3E, Gary Hendrickson
W3DTN and yours truly. Thanks to those in the wings about to
cover a shift: Pete Young, K3IN, and Art Feller, W4ART.

We are looking for two or three volunteers to meet me tomorrow
morning at the chamber to help the team pack up. (Lou would
like to start the trip back to Orlando first thing Saturday
morning.) To make the security clearances easier, the volunteer
overnight "sat sitters" would be a first choice in the packing
tasks. Please contact me ASAP to confirm.

There were a whole score of AMSAT names from out of town
during this test phase that you would readily recognize. See
the many team members by going to the P3D Lab web site at
<http://www.magicnet.net/~phase3d/>. Check back often to
keep track of the P3D spacecraft until it returns for vibration
testing in the winter at the NASA Goddard Space Flight Center.

An important part of this group was the P3D RUDAK (packet
radio) team. Go to <http://users.sgi.net/~hprice/rudaktv.htm>

and see some of their outstanding and memorable photos!

And don't forget ...

Visit AMSAT-DC
http://garc.gsfc.nasa.gov/~simsat/ssamsatdc.html

Visit AMSAT-NoVA
http://garc.gsfc.nasa.gov/~simsat/ssamsatnova.html

Way to go!

Sincerely,

Pat WD8LAQ
NASA-ARRL-AMSAT-TAPR-GARC

==
Patrick L. Kilroy   (ex-743)
SSPP Hitchhiker I&T Engineer   Phone: 301-286-1984
NASA Goddard Space Flight Center Fax: 301-286-1673
Building 5, New Mail Code 568   E-mail: pat.kilroy@gsfc.nasa.gov
Greenbelt, Maryland 20771   Web: http://sspp.gsfc.nasa.gov
==

   Visit SimSat at http://garc.gsfc.nasa.gov/~simsat/index.html

41. DGPS beacon Set Up?

From: Bob Bruninga <bruninga@nadn.navy.mil>
Date: Wed, 28 Oct 1998 22:16:17 -0500 (EST)
To: tacgps@tapr.org
Message-ID: <Pine.GSO.4.05L.9810282212500.3226-100000@arctic>
Rendered body type: text/plain

I received this from a foreign station trying to set up a DGPS station.
Can anyone answer these?

Quote

I have bought DGPS reference station kit and Motorola on core GPS
receiver from TAPR. I am constructing it.
I am going to experiment it for APRS-DGPS beacon. I have KPC-3
version 6.0 (too old). How should I setup these equipment?

I think....
1) Set the call sign in KPC-3.
2) Set the unploto DGPS via WIDE
3) Set KPC-3 to converce mode.
4) Disconnect the PC from KPC-3.
5) Connect the DGPS unit to KPC-3

Is that right?
But how to set a interval time of beacon?

----
unquote

Thanks de WB4APR

42. Re: [TACGPS:1895] DGPS beacon Set Up?

From: "Pete Prossen" <prossen@znet.com>
Date: Wed, 28 Oct 1998 09:04:13 -0800
To: <tacgps@tapr.org>
Message-ID: <199810290503.VAA04029@sd.znet.com>
Rendered body type: text/plain

I don't know if the 6.0 firmware honors all of the commands below, but
here's one way to get it working. My reference station also receives NMEA
back from rovers, so I must disallow the input echo and echo of transmitted
packets.

MYCALL <insert your call here>
UNPROTO DGPS (or whatever you want to use for the dummy name)
BTEXT <descriptive text for your beacon that explains the transmissions>
BEACON E 1 (an example that sends the explanation beacon every 1 minute)
CONMODE CONVERS
PMODE CONV (so TNC will power up in conversational mode)
NOMODE OFF (otherwise CONMODE won't work)

ECHO OFF (don't echo the input data)
MXMIT OFF (don't send transmitted packets back out the async port)
STREAMSW $00 (see explanation below)

It is important to re-define the stream switch character. The default is
$7C which occurs in normal RTCM data. So if you don't change to
some value below $40 (out of the range of RTCM characters), your TNC will
periodically stop transmitting because it has been told to switch streams.

It might be a good idea to get an update EPROM for your KPC-3. The
most recent version I'm aware of is 8.3. This version has a new command
named MYDGPS. It won't help with the reference station, but is useful
for a rover trying to receive DGPS while the TNC is in the GPS mode.

Regards

Pete Prossen

WA6ZUH

> I have bought DGPS reference station kit and Motorola on core GPS
> receiver from TAPR. I am constructing it.
> I am going to experiment it for APRS-DGPS beacon. I have KPC-3
> version 6.0 (too old). How should I setup these equipment?
>
> I think....
> 1) Set the call sign in KPC-3.
> 2) Set the unploto DGPS via WIDE
> 3) Set KPC-3 to converce mode.
> 4) Disconnect the PC from KPC-3.
> 5) Connect the DGPS unit to KPC-3
>
> Is that right?
> But how to set a interval time of beacon?
>
> --------------------------
> unquote
>
> Thanks de WB4APR

43. Re: [TACGPS:1890] Re: No 1PPS signal w/Garmin GPS25

From: "Dan Hinz, Jr." <dan.hinz@ieee.org>
Date: Wed, 28 Oct 1998 21:06:58 -0800
To: tacgps@tapr.org
Message-ID: <3637F7F2.F8D85CBF@ieee.org>
Rendered body type: text/plain

Thanks, it is working like a charm. Now to mount the antenna permanently.
73,
Dan

Dave Martindale wrote:

> >Do I need to enable the 1PPS output? if so, how?
>
> Yes, you do. For some reason, the GPS 25 seems to use one channel's worth
> of DSP power generating the 1 PPS output. So either you get 12 receiver
> channels and no 1PPS (default config) or you get 11 channels plus 1PPS.
>
> Just get the serial port working, then send something like the following
> to the receiver. Then power off and back on, and you should have 1 PPS.
>
> $PGRMC,,,,,,,,,,,,2,4,
> $PGRMCE
>
> Note that you need to send CR/LF after each line. The "2" in the above
> enables the 1 PPS output, and the "4" programs a 100 ms "high" duration
> for the 1 PPS output. The PGRMCE command tells the GPS to send you
> its current settings, so you can verify that the change happened OK.
>
> All this is explained in the GPS 25 LP manual. It also explains how
> to put the GPS in 2D mode (3D is default) with a specified altitude;
> this probably increases the accuracy of the 1 PPS output. You can
> turn output sentences on and off to get just the ones you want.
> And you can enable raw data (pseudorange and phase) on the other
> serial port.
>

>   Dave

44. Windows Motorola Configuration program

From: Eduardo Jacob <edu@kender.es>
Date: Thu, 29 Oct 1998 08:44:38 -0100
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19981029084438.00803790@kender.es>
Rendered body type: text/plain

I have received my new Motorola Oncore VP from Tapr and I have two cuestions:

        Is there a windows program for configurating the Oncore to use instead the dos progam supplied?

        I haven't read throughfully the docs, but it seems there is not documentation about the carrier phase option. Is it available?

        Eduardo/EA2BAJ

45. Re: [TACGPS:1896] Re: DGPS beacon Set Up?

From: Michael Huslig <mhuslig@idir.net>
Date: Thu, 29 Oct 1998 09:39:19 -0600
To: tacgps@tapr.org
Message-ID: <1.5.4.16.19981029153919.19e76042@pop3.idir.net>
Rendered body type: text/plain

Version 8.3 is available for the KPC3+ only. The latest version for the original KPC3 is 8.2
Mike (mhuslig@kantronics.com)

At 11:04 PM 10/28/98 -0600, you wrote:
>I don't know if the 6.0 firmware honors all of the commands below, but
>here's one way to get it working. My reference station also receives NMEA
>back from rovers, so I must disallow the input echo and echo of transmitted
>packets.
>
>MYCALL <insert your call here>
>UNPROTO DGPS (or whatever you want to use for the dummy name)
>BTEXT <descriptive text for your beacon that explains the transmissions>
>BEACON E 1 (an example that sends the explanation beacon every 1 minute)
>CONMODE CONVERS
>PMODE CONV (so TNC will power up in conversational mode)
>NOMODE OFF (otherwise CONMODE won't work)
>ECHO OFF (don't echo the input data)
>MXMIT OFF (don't send transmitted packets back out the async port)
>STREAMSW $00 (see explanation below)
>
>It is important to re-define the stream switch character. The default is
>$7C which occurs in normal RTCM data. So if you don't change to
>some value below $40 (out of the range of RTCM characters), your TNC will
>periodically stop transmitting because it has been told to switch streams.
>
>It might be a good idea to get an update EPROM for your KPC-3. The
>most recent version I'm aware of is 8.3. This version has a new command
>named MYDGPS. It won't help with the reference station, but is useful
>for a rover trying to receive DGPS while the TNC is in the GPS mode.
>
>Regards
>
>Pete Prossen
>
>WA6ZUH
>
>
>
>> I have bought DGPS reference station kit and Motorola on core GPS
>> receiver from TAPR. I am constructing it.
>> I am going to experiment it for APRS-DGPS beacon. I have KPC-3
>> version 6.0 (too old). How should I setup these equipment?
>>
>> I think....
>> 1) Set the call sign in KPC-3.
>> 2) Set the unploto DGPS via WIDE
>> 3) Set KPC-3 to converce mode.
>> 4) Disconnect the PC from KPC-3.
>> 5) Connect the DGPS unit to KPC-3
>>
>> Is that right?
>> But how to set a interval time of beacon?

>>
>> -------------------------
>> unquote
>>
>> Thanks de WB4APR
>
>

46. Re: [TACGPS:1898] Windows Motorola Configuration program

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Thu, 29 Oct 1998 15:13:47 +0000
To: tacgps@tapr.org
Message-ID: <3638862B.B382BF81@clark.net>
Rendered body type: text/plain

Eduardo Jacob wrote:
>
> I have received my new Motorola Oncore VP from Tapr and I have two cuestions:
>
>   Is there a windows program for configurating the Oncore to use instead the
> dos progam supplied?
>
>   I haven't read throughfully the docs, but it seems there is not
> documentation about the carrier phase option. Is it available?
>
>   Eduardo/EA2BAJ

Eduardo -- Rick's (WB2TNL) TAC32 Windows software is what you want. Fetch
it from
either TAPR or CNSSYS:
     http://www.tapr.org
 or http://www.cnssys.com

It's much more "user friendly" than the Motorola software, and much more
robust than my antique SHOWTIME program.

Regarding carrier phase, you can check to see what options are available in
TAC32. Hit [VIEW][RCVR ID MESSAGE] where the top of the display will looks
something like

> @@Cj
> COPYRIGHT 1991-1997 MOTOROLA INC.
> SFTW P/N # 98-P36830P
> SOFTWARE VER # 10
> SOFTWARE REV # 0
> SOFTWARE DATE 24 Sep 1997
> MODEL #   B8221Z1116
> HDWR P/N # _
> SERIAL #   SSG0258495
> MANUFACTUR DATE 7M17
> OPTIONS LIST   IBC

On the last line, the BC options show that this receiver has all the
"special"
outputs available, while "I" eans that the receiver has 1PPS output with
full
TRAIM support.

The same message is also available from the Motorola controller and
SHOWTIME.

73, Tom

47. TAC32 Beta 15

From: "James L. Johnson" <jjjohnson@saiph.hpl.hp.com>
Date: Thu, 29 Oct 1998 08:55:34 -0800 (PST)
To: tacgps@tapr.org
Message-ID: <199810291655.IAA12333@saiph.hpl.hp.com>
Rendered body type: text/plain

I have the TAC32Beta15 up and running with a UT+
receiver and all is looking good so far. This is a very
fine piece of work by Rick Hambly.

Jim Johnson
W6SC
jjohnson@hpl.hp.com

48. Re: [TACGPS:1900] Re: Windows Motorola Configuration program

From: Eduardo Jacob <edu@kender.es>
Date: Thu, 29 Oct 1998 21:06:17 -0100
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19981029210617.00825bf0@kender.es>
Rendered body type: text/plain

>It's much more "user friendly" than the Motorola software, and much more
>robust than my antique SHOWTIME program.

Yes, I know of it. I think I'll be registering it soon. Another nice
utility is SA Watch.
I was thinking of something to program the Oncore and see the results, more
or less like
the GPS Control Program in the diskette. I got a nice program for the
garmin SL20.

>Regarding carrier phase, you can check to see what options are available in
>TAC32. Hit [VIEW][RCVR ID MESSAGE] where the top of the display will looks
>something like
...
>On the last line, the BC options show that this receiver has all the
>"special" outputs available, while "I" eans that the receiver has 1PPS
output with
>full TRAIM support.

Yes, mine is the same. I was thinking about information about the carrier
option pahse, what does it really mean.

Btw, any good news about TOC?, I am still thinking of assembling a good
frec. reference, but the rub approach seems a little expensive to me.

Regards

Eduardo/EA2BAJ

49. Re: [TACGPS:1901] TAC32 Beta 15

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Thu, 29 Oct 1998 20:29:43 -0500
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19981029202943.00831460@appstate.campus.mci.net>
Rendered body type: text/plain

Jim,

Did you get your UT+ from Synergy Systems? I have been debating whether to
get the UT+ from them ($190) versus VP thru TAPR. I'm mainly interested in
frequency/steering and the UT+ looks as good as the VP for this purpose,
and a lower cost.

73's
Don, W4DH

At 11:00 AM 10/29/98 -0600, you wrote:
>
> I have the TAC32Beta15 up and running with a UT+
>receiver and all is looking good so far. This is a very
>fine piece of work by Rick Hambly.
>
>Jim Johnson
>W6SC
>jjohnson@hpl.hp.com

50. Re: [TACGPS:1903] Re: TAC32 Beta 15

From: Jim Johnson <jjjohnson@saiph.hpl.hp.com>
Date: Fri, 30 Oct 1998 10:47:33 PST
To: tacgps@tapr.org
Message-ID: <199810301847.KAA10287@saiph.hpl.hp.com>
Rendered body type: text/plain

>
> Jim,
>
> Did you get your UT+ from Synergy Systems? I have been debating whether to
> get the UT+ from them ($190) versus VP thru TAPR. I'm mainly interested in
> frequency/steering and the UT+ looks as good as the VP for this purpose,
> and a lower cost.
>

> 73's
> Don, W4DH
>

Hi Don,

  No, we obtained it through Motorola/HP channels. The VP is the
better receiver (and more expensive) but if you're looking at ham
radio applications (as opposed to a professional calibration
laboratory), the UT+ should be just fine.

73,

Jim W6SC
Hewlett-Packard Laboratories
Palo Alto, CA

51. RE: UT+ vs. VP?

From: Mastenbrook Gary-G13216 <g13216@email1.wes.mot.com>
Date: Fri, 30 Oct 1998 13:31:57 -0600
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <51F347B016ADD011963200805FC145620340E24C@email1.wes.mot.com>
Rendered body type: text/plain

Jim & all,
The UT+ should have better RF performance (due to the extra filtering in
the frontend) as well as equivalent (or better) timing performance than
the VP. The UT+ is a newer model than the VP and is optimized for low
cost high performance GPS timing applications. If I was putting
together a TAC/TOC, I'd use a UT+ over a VP if one was available just to
get the better RF rejection performance at my 'radio-active' laboratory.
If you're trying to "do it all" and intend to implement a DGPS REF
STATION along side your TAC, then you'll need the VP as it includes that
functionality in the SW load. I believe that the UT+ also has more 1
PPS pulse flexibility than the VP and also includes some other output
timing capabilities on the 1 PPS pin. The UT+ also has a site survey
mode where it can automatically average its location for a set number of
samples, then switch to timing mode for precise timing applications.

Note that the UT+ and the VP are not the same hardware unit with just a
different code load. Instead, the UT+ product is the newer
hardware/software version of the older VP product. (Motorola also makes
a vehicular applications version called the OnCore GT which is similar
hardware wise to the UT+, but has NMEA capability added instead of the
TRAIM and other timing functions used in the UT+. The VP had combined
both of these into one receiver...)
73's
Gary N8DMT
>
> Jim,
>
> Did you get your UT+ from Synergy Systems? I have been debating
whether to
> get the UT+ from them ($190) versus VP thru TAPR. I'm mainly
interested in
> frequency/steering and the UT+ looks as good as the VP for this
purpose,
> and a lower cost.
>
> 73's
> Don, W4DH
>

Hi Don,

  No, we obtained it through Motorola/HP channels. The VP is the
better receiver (and more expensive) but if you're looking at ham
radio applications (as opposed to a professional calibration
laboratory), the UT+ should be just fine.

73,

Jim W6SC
Hewlett-Packard Laboratories
Palo Alto, CA

52. Re: [TACGPS:1904] Re: TAC32 Beta 15

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Fri, 30 Oct 1998 14:32:06 -0600
To: tacgps@tapr.org
Message-ID: <v04011703b25fd2b24ea5@[128.83.74.103]>
Rendered body type: text/plain

TAPR offers the UT+ as well.

Cheers -- Greg

>>
>> Jim,
>>
>> Did you get your UT+ from Synergy Systems? I have been debating whether to
>> get the UT+ from them ($190) versus VP thru TAPR. I'm mainly interested in
>> frequency/steering and the UT+ looks as good as the VP for this purpose,
>> and a lower cost.
>>
>> 73's
>> Don, W4DH
>>
>
>Hi Don,
>
> No, we obtained it through Motorola/HP channels. The VP is the
>better receiver (and more expensive) but if you're looking at ham
>radio applications (as opposed to a professional calibration
>laboratory), the UT+ should be just fine.
>
>73,
>
>Jim W6SC
>Hewlett-Packard Laboratories
>Palo Alto, CA

Greg Jones, WD5IVD   Austin, Texas
wd5ivd@tapr.org   http://www.tapr.org/~wd5ivd

53. Re: [TACGPS:1905] RE: UT+ vs. VP?

From: Jim Johnson <jjjohnson@saiph.hpl.hp.com>
Date: Fri, 30 Oct 1998 14:53:46 PST
To: tacgps@tapr.org
Message-ID: <199810302253.OAA20497@saiph.hpl.hp.com>
Rendered body type: text/plain

>
> Jim & all,
> The UT+ should have better RF performance (due to the extra filtering in
> the frontend) as well as equivalent (or better) timing performance than
> the VP. The UT+ is a newer model than the VP and is optimized for low
> cost high performance GPS timing applications. If I was putting
> together a TAC/TOC, I'd use a UT+ over a VP if one was available just to
> get the better RF rejection performance at my 'radio-active' laboratory.
> If you're trying to "do it all" and intend to implement a DGPS REF
> STATION along side your TAC, then you'll need the VP as it includes that
> functionality in the SW load. I believe that the UT+ also has more 1
> PPS pulse flexibility than the VP and also includes some other output
> timing capabilities on the 1 PPS pin. The UT+ also has a site survey
> mode where it can automatically average its location for a set number of
> samples, then switch to timing mode for precise timing applications.
>
> Note that the UT+ and the VP are not the same hardware unit with just a
> different code load. Instead, the UT+ product is the newer
> hardware/software version of the older VP product. (Motorola also makes
> a vehicular applications version called the OnCore GT which is similar
> hardware wise to the UT+, but has NMEA capability added instead of the
> TRAIM and other timing functions used in the UT+. The VP had combined
> both of these into one receiver...)
> 73's
> Gary N8DMT

Hi Gary and all,

   Yes indeed, the points you make about the added features and lower
cost are quite true, but my colleague makes the point that in his work
he is able to average below the level of SA, and at that level the VP is
a "quieter" receiver than the UT+. This could be the result of the
lower cost chipset as you pointed out. I guess this reinforces my point
that for ham radio applications, the UT+ is probably the better choice

because of the lower cost and richer feature set than the VP, and the
quieter performance of the VP would never be seen outside of a
sophisticated laboratory. Speaking of features, apparently the VP does
not have the feature that flags a disconnected antenna, whereas the UT+
does have this. Thanks again for your input on these receivers.

73,
Jim W6SC

54. Re: [TACGPS:1906] Re: TAC32 Beta 15

From: "Donald E. Haselwood" <k4jpj@appstate.campus.mci.net>
Date: Fri, 30 Oct 1998 17:50:14 -0500
To: tacgps@tapr.org
Message-ID: <3.0.5.32.19981030175014.007c0b70@appstate.campus.mci.net>
Rendered body type: text/plain

I rummaged around www.tapr.org, but didn't find UT+ material. Did I miss
something?

73's
Don, W4DH

>TAPR offers the UT+ as well.
>-----
>Greg Jones, WD5IVD   Austin, Texas
>wd5ivd@tapr.org   http://www.tapr.org/~wd5ivd

55. Re: [TACGPS:1907] RE: UT+ vs. VP?

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Sat, 31 Oct 1998 05:15:43 +0000
To: tacgps@tapr.org
Message-ID: <363A9CFF.D8593EC9@clark.net>
Rendered body type: text/plain

Responding to some comments from Gary (N8DMT) and Jim (W6SC):

First Gary --
> The UT+ should have better RF performance (due to the extra filtering in
> the frontend) as well as equivalent (or better) timing performance than
> the VP. The UT+ is a newer model than the VP and is optimized for low
> cost high performance GPS timing applications .... [snip]

The UT+ was really designed for time/freq synchronization at cellular
phone sites, which (IMHO) was the reason that Motorola tightened up on
the filtering. However, it is my understanding that the latest "B8" VPs
(which is what TAPR has been providing for the past few months with Rev 10
firmware in them) have also had their RFI performance improved -- see
         http://www.synergy-gps.com/vponcore.html

> If you're trying to "do it all" and intend to implement a DGPS REF
> STATION along side your TAC, then you'll need the VP as it includes that
> functionality in the SW load. I believe that the UT+ also has more 1
> PPS pulse flexibility than the VP and also includes some other output
> timing capabilities on the 1 PPS pin. The UT+ also has a site survey
> mode where it can automatically average its location for a set number of
> samples, then switch to timing mode for precise timing applications.
> [snip]

IMHO, the "DGPS" option available in the VP (and not the UT+) is one of
the major reasons to make the VP be the better choice. Even if you don't
plan to use the VP as a DGPS base station (using N7HPR's TAPR DGPSIB), the
DGPS output is very useful. One of the major research topics I did in
formulating the basic TAC concept was to characterize the actual power
spectrum of SA. To do this, I recorded the pseudorange (PR) and pseudorange
rate (PRR) errors reported in the DGPS message, and then did a lot of power
spectral analysis on the errors. This led me to the conclusion that SA was
a band-limited process with spectral components ranging from a few seconds
down to ~30 minutes. This information was invaluable in trying to optimize
the filters that "remove" SA.

There is no "added flexibility" in the UT+ 1PPS output. However it does
offer the user the option of selecting a 100PPS output rate in lieu of the
normal 1PPS output. Last spring I reported on an idea on how to add a
second selectable rate with about $25 in parts (all DigiKey stock) and
two ICs. The Timing Interpolator could be used to make rates like 50PPS,
1kPPS, 2kPPS, 10PPS etc in addition to the UT+ 100 PPS. Nobody showed
much interest, but this design could be rejuvenated. If there is need
for a GPS-referenced pulse generator (like as an interrupt generator,
marker for seismograms, etc) please speak up.

Regarding the "self-survey" in the UT+ -- this option has always existed in software in both my original SHOWTIME and Rick's TAC32. As I understand the UT+ self survey, it is fixed at 10,000 seconds. IMHO this is too short a period for a proper self-survey. My recommendation has always been a minimum of 1/2 day (43,200 sec) and 1 day if possible.

You should also note that the VP does support "human readible" NMEA outputs in lieu of the faster and more flexible (but illegible) binary. For me, NMEA has been a valuable resource to have when I'm diagnosing performance.

In reply, Jim added:
> Yes indeed, the points you make about the added features and lower
> cost are quite true, but my colleague makes the point that in his work
> he is able to average below the level of SA, and at that level the VP is
> a "quieter" receiver than the UT+ [snip]

I presume this refers to some of Robin's efforts. Most of my detailed probing of timing performance has been with the VP, and my experience is that it is an incredible timing "engine". The low-cost other receiver that looks very promising is the Canadian Marconi "ALLSTAR" CMC-12. The CMC-12 seems to be a "winner" for carrier phase recovery applications.

On the negative side (vis a vis the VP series), I have heard two persistent Motorola rumors -- which I wonder if anyone can confirm. Let me stress that these are only rumors and not factoids!

(1) Motorola has been putting all their development efforts into the UT+ and GT platforms. I get the feeling that they think of the general-purpose VP as a dinosaur and they would like to concentrate on the newer engines.

(2) There have been hints that Motorola is planning some sort of 12-channel "engine" in the near future, but have been rather mum about it since they don't want to have any erosion of the sales of the present GT/UT engines. The hint I heard was that this might be announced 4Q98 or 1Q99. And none of my rumor sources hint that the 12-channel will be a VP -- which in turn tells me that Motorola is trying to get out of the DGPS Base Station business.

73, Tom

November 1998

Original source file: tacgps.9811
Source: http://ftp.tapr.org/product_docs/TAC2/mail_archives/tacgps.9811

1. UT+ or VP?

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Sun, 1 Nov 1998 10:32:49 -0500
To: "TAC-2 mail list" <tacgps@tapr.org>
Message-ID: <000301be05ac$e1cd6240$d41e5c18@john.tampabay.rr.com>
Rendered body type: text/plain

Tom --

One quick question which will require an even quicker answer. I am about ready to place an order with TAPR for a Motorola GPS receiver. I want it to be the best choice for use as a good timing unit with the best stable, jitter-free 1 PPS output available for use with Brooks Shera's steering unit which will control my Rb standard. If you had to make this choice today without regard to cost, would you choose the UT+ or the VP?

Thanks for your answer.

One more comment --
Yes, there is lots of interest in your GPS-referenced pulse generator. I have a schematic of the design you published some months ago which I think is what you are referring to. It is currently sitting on my desk in the "Hot Projects" basket. It has a sticky note attached which reads: "Boy I sure wish I had a ready-made PC board for this".

73 John W4SF

2. Info on Choke Ring Antennas anyone?

From: Jeff Vollin <barnie@flash.net>
Date: Sun, 15 Nov 1998 19:16:44 -0700
To: tacgps@tapr.org
Message-ID: <364F8B0B.E86E41F1@flash.net>
Rendered body type: text/plain

Some time back, Dr Thomas A Clark (W3IWI) wrote:

> -- snip --
>
> Steve also mentioned trying a lower multipath choke-ring antenna. FYI,
> I now have built a really cheap choke ring antenna using $10 worth of parts
> from the local hardware store and one of the Motorola Antenna97 antennas
> that TAPR has for sale. As a part of a program I have to do really high
> accuracy calibrations of geodetic GPS antennas, I ran my "$50 special"
> and it looked really good. Is there any interest?
>

I never saw a posting on this antenna. I am interested in finding what factors lead
to the best DGPS performance and I would like to try a choke ring antenna. I have the
ability to machine the antenna from solid stock, so I really just need dimensions. Anyone
out there know the proper dimensions? I would also like to hear from anyone who is
running a DGPS Ref Station what they have found to get the best performance. (I have
not ovenized yet.)

Jeff Vollin, KC6WFU

3. TAC32 and PC Clock

From: "Victor A. Kean, Jr." <vkean@ds.net>
Date: Mon, 23 Nov 1998 19:21:52 -0500
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <01BE1716.8728F400@desk.k1lt.ampr.org>
Rendered body type: text/plain

My instance of TAC32 running on my Win95 machine doesn't seem to be able to set the PC clock. What am I doing wrong? I couldn't find a discussion in the manual, though that mean I just can't read :-)

Vic, K1LT

4. Re: [TACGPS:1912] TAC32 and PC Clock

From: Jim Johnson <jjjohnson@saiph.hpl.hp.com>
Date: Mon, 23 Nov 1998 16:57:24 PST
To: tacgps@tapr.org
Message-ID: <199811240057.QAA25413@saiph.hpl.hp.com>
Rendered body type: text/plain

> My instance of TAC32 running on my Win95 machine doesn't seem to be able to set the PC clock. What am I doing wrong? I couldn't find a discussion in the manual, though that mean I just can't read :-)
>
> Vic, K1LT
>
>

Well Vic, I must admit, I've been there and had it happen to me too. My problem was that I didn't have a 1PPS connection on the DCD line to my pc. There are two signs that appear if you don't have it ... if the display digits are blue instead of black, and if you don't see a "ticking" red light on the display. If you can assure yourself that you have a proper 1PPS connection, the TAC32 sets the pc clock just fine.

Good luck,

Jim W6SC
jjohnson@hpl.hp.com

5. RE: [TACGPS:1912] TAC32 and PC Clock

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Mon, 23 Nov 1998 20:14:59 -0500
To: <tacgps@tapr.org>
Message-ID: <000001be1747$dac038e0$101161cf@rick.cnssys.com>
Rendered body type: text/plain

Vic,

This probably means you do not have a 1PPS signal. Is the heartbeat monitor in the status bar lighting up once per second?

Tac32 Version 2.0 will have an option to allow the PC clock to be set without a 1PPS signal, although the accuracy of the resulting time will be significantly degraded.

Rick
WB2TNL

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Victor A. Kean, Jr.
Sent: Monday, November 23, 1998 7:25 PM
To: tacgps@tapr.org
Subject: [TACGPS:1912] TAC32 and PC Clock

My instance of TAC32 running on my Win95 machine doesn't seem to be able to set the PC clock. What am I doing wrong? I couldn't find a discussion in the manual, though that mean I just can't read :-)

Vic, K1LT

6. RE: [TACGPS:1913] Re: TAC32 and PC Clock

From: "Victor A. Kean, Jr." <vkean@ds.net>
Date: Mon, 23 Nov 1998 20:58:47 -0500
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <01BE1724.1151FD40@desk.k1lt.ampr.org>
Rendered body type: text/plain

Ah, well you supplied the correct answer. I don't have the 1PPS hooked up. I was kinda hoping it would set the time anyway, since this particular PC drifts quickly. Guess I'll just have to go buy an Oncore and the interface board ...

thanks!

Vic

From: Jim Johnson[SMTP:jjjohnson@saiph.hpl.hp.com]
Reply To: tacgps@tapr.org
Sent: Monday, November 23, 1998 8:03 PM

To: tacgps@tapr.org
Subject: [TACGPS:1913] Re: TAC32 and PC Clock

>
> My instance of TAC32 running on my Win95 machine doesn't seem to be able to set the PC clock. What am I doing wrong? I couldn't find a discussion in the manual, though that mean I just can't read :-)
>
> Vic, K1LT
>
>

Well Vic, I must admit, I've been there and had it happen to me too. My problem was that I didn't have a 1PPS connection on the DCD line to my pc. There are two signs that appear if you don't have it ... if the display digits are blue instead of black, and if you don't see a "ticking" red light on the display. If you can assure yourself that you have a proper 1PPS connection, the TAC32 sets the pc clock just fine.

Good luck,

Jim W6SC
jjohnson@hpl.hp.com

7. RE: [TACGPS:1914] RE: TAC32 and PC Clock

From: "Victor A. Kean, Jr." <vkean@ds.net>
Date: Mon, 23 Nov 1998 20:59:32 -0500
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <01BE1724.2BD2A840@desk.k1lt.ampr.org>
Rendered body type: text/plain

Nope, thanks for the quick response. I'll be awaiting the availability of Version 2.

Vic

From: Richard M. Hambly[SMTP:rick@cnssys.com]
Reply To: tacgps@tapr.org
Sent: Monday, November 23, 1998 8:17 PM
To: tacgps@tapr.org
Subject: [TACGPS:1914] RE: TAC32 and PC Clock

Vic,

This probably means you do not have a 1PPS signal. Is the heartbeat monitor in the status bar lighting up once per second?

Tac32 Version 2.0 will have an option to allow the PC clock to be set without a 1PPS signal, although the accuracy of the resulting time will be significantly degraded.

Rick
WB2TNL

-----Original Message-----
From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Victor A. Kean, Jr.
Sent: Monday, November 23, 1998 7:25 PM
To: tacgps@tapr.org
Subject: [TACGPS:1912] TAC32 and PC Clock

My instance of TAC32 running on my Win95 machine doesn't seem to be able to set the PC clock. What am I doing wrong? I couldn't find a discussion in the manual, though that mean I just can't read :-)

Vic, K1LT

8. GPS Antennae designs...

From: Darryl Smith <vk2tds@ozemail.com.au>
Date: Fri, 27 Nov 1998 19:42:30 +1100
To: tacgps@tapr.org
Message-ID: <365E65F5.A4FD78C9@ozemail.com.au>
Rendered body type: text/plain

G'Day

I have just purchased a few Oncore GPS recievers for a very good price, but now I need to build a few antennas. I checked through the archives and could not find all that much for GPS recievers.

Can anyone suggest a source for designs? I have read about Tom W3IWI's
designs but have never seen details. What would be good is an amplified
design the size of a stack of 5-10 CD's (or even better using 5-10 AOL
CD's :-)

Thanks for any help

Darryl VK2TDS
Sydney, Australia

9. Re: [TACGPS:1917] GPS Antennae designs...

From: Donald E Haselwood <k4jpj@appstate.campus.mci.net>
Date: Fri, 27 Nov 1998 08:05:58 -0500
To: tacgps@tapr.org
Message-ID: <3.0.6.32.19981127080558.007dcdf0@appstate.campus.mci.net>
Rendered body type: text/plain

Darryl,

The following has articles on building a patch ants. I remember seeing a
graph in an ant book that showed that the loss increases as the dielectric
increases; therefore an air dielectric ant should be substantially better
than these "tiny" patch ant's we see in GPS units.

73's
Don, W4DH

>-- John Melton n6lyt/g0orx
-----Original Message-----
From: John Melton <John.Melton@uk.sun.com>
To: amsat-bb@AMSAT.Org <amsat-bb@AMSAT.Org>
Date: Saturday, November 07, 1998 6:51 AM
Subject: Re: [amsat-bb] PATCH ANTENNAS,

>Searching around the web i found the following patch antenna information by
Chris
>Faga (WB2VVV):
>
> http://www.wb2vvv.com/Articles/patch1.html
> http://www.wb2vvv.com/Articles/NARROW~2.htm
>
>-- John Melton n6lyt/g0orx
At 02:46 AM 11/27/98 -0600, you wrote:
>G'Day
>
>I have just purchased a few Oncore GPS recievers for a very good price,
>but now I need to build a few antennas. I checked through the archives
>and could not find all that much for GPS recievers.
>
>Can anyone suggest a source for designs? I have read about Tom W3IWI's
>designs but have never seen details. What would be good is an amplified
>design the size of a stack of 5-10 CD's (or even better using 5-10 AOL
>CD's :-)
>
>Thanks for any help
>
>Darryl VK2TDS
>Sydney, Australia
>
>
>

10. Re: [TACGPS:1917] GPS Antennae designs...

From: Dave Martindale <davem@cs.ubc.ca>
Date: Fri, 27 Nov 1998 08:35:11 -0800
To: tacgps@tapr.org
Message-ID: <l03130300b2847fdce857@[198.162.38.159]>
Rendered body type: text/plain

>Can anyone suggest a source for designs? I have read about Tom W3IWI's
>designs but have never seen details. What would be good is an amplified
>design the size of a stack of 5-10 CD's (or even better using 5-10 AOL
>CD's :-)

Take a look at "gpspatch.zip" on http://vancouver-webpages.com/peter/idx_gps.html

It's an air-dielectric patch, designed specifically to have relatively
wide bandwidth so it can be built without extremely critical measuring.
I built one, and it receives overhead satellites very well, though lower
elevation ones are weaker.

As described, it's a passive antenna using two brass sheets. I couldn't
find brass stock large enough for the ground plane portion when I built
mine, so I used single-sided PC board with the copper up. Since the
fiberglass is not part of the dielectric between the antenna element
and ground plane, it shouldn't have any effect on the behaviour of
the antenna.

Someone else pointed out that if you use a PC board groundplane like this,
it's pretty easy to start with double-sided board, and etch the bottom
side to provide a place to install an MMIC preamp, with the signal
paths from the antenna to the MMIC and from the MMIC to output coax
being 50 ohm microstrip. I haven't tried this, but it seems that
it should work well.

Other designs: Someone else somewhere on the web suggested building
an 8-turn helix on ABS DWV (drain waste vent) plumbing pipe. It is
almost exactly the diameter you need (60 mm) to make the circumference
one wavelength, and an 8-turn helix makes a nice high-gain antenna.
Which, if you think about it, is a really dumb idea, because a GPS
antenna should *not* be directional. Sure enough, there a a deep
null in the pattern for satellites somewhere around 45 degrees elevation.

However, someone (Tom?) pointed out that a *two* turn helix isn't
very directional, and with an MMIC preamp (to compensate for low gain)
makes a good GPS antenna. I think he made his from a yoghurt container
and an aluminum pie plate, which is certainly good for low cost. The
ABS pipe is still an option if you'd like a slightly more robust helix
form.

Finally, I've seen another design somewhere on the web for a quadrifilar
helix antenna made out of thin semi-rigid coax. It also looks like a
good design, but I don't have the URL handy. Try searching for "gps
antenna" and "quadrifilar" on the web.

I know it would be attractive to do something useful with the AOL CD's,
but I don't think you can make a circular patch circularly polarized.
You'd at least have to change it into an ellipse, and that nonconducting
hole in the center would be a problem too. The best use I've found for
them is to put them around Christmas lights as reflectors. The center
hole is large enough for the bulb base to go through, but small enough
to be held by the bulb body and socket.

        Dave

11. Re: [TACGPS:1919] Re: GPS Antennae designs...

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Mon, 30 Nov 1998 06:43:51 +0000
To: tacgps@tapr.org
Message-ID: <36623EA7.16ABE94A@clark.net>
Rendered body type: text/plain

Since my name was taken in vain ;<}

First, John Melton asked:
> Can anyone suggest a source for designs? I have read about Tom W3IWI's
> designs but have never seen details. What would be good is an amplified
> design the size of a stack of 5-10 CD's (or even better using 5-10 AOL
> CD's :-)

The antenna I have shown is a 2-turn Helix. I noted that a small Yoplait
Yoghurt cup (a slightly tapered cone) was a good size to use. The "magic"
numbers are that a helix should have a circumference ~1 wavelength, and
that
the "screw" should have a pitch angle ~10 degrees. Since GPS L1 = 1575 MHz,
1 wavelength = 19 cm, and hence the proper diameter is 19/pi = 6 cm = 2.4".
Since a helix is a wide-band device, you can be in error by up to ~20%, so
2" diameter is OK. The 10 degree pitch means that the height of each turn
is 19*sin(10 deg)= 3.3 cm = 1.3". The material is not critical. I have used
wire, but for the Yoplait helix, I used 1/4" wide adhesive-backed foil
tape.

The feed-point impedance of a helix is ~140 ohms, and to make a better
match
into 50 ohms, the common practice is to make the initial quarter-turn be

"flat" and fairly close to the ground plane. With the Yoplait cup, I used copper foil tape for the launching section and found that I got a good match using the "Nutrition Facts" box as a template.

In my Yoplait helix, I used a MiniCircuits ERA-3 MMIC amplifier (cost ~$2). The only other "real parts" needed were a ~20 ohm 1/4 watt resistor and an SMA connector.

I had intended to write it up, but I became discouraged over mechanical problems. First of all, the plastic in the Yoplait cup did not weather well,
was brittle, and was hard to glue to the ground-plane. Second, I never did come up with a rugged way to mount the MMIC amplifier so that its leads would not be stressed and break after use.

Thaqt was about the time that we started to get the nifty little Motorola "Antenna-97" for ~$50 (see http://www.tapr.org or http://www.cnssys.com). That little off-the-shelf antenna outperformed my helix and I didn't have to teach folks how to build microwave circuits. So I gave up on the project -- not that it didn't work, but it wasn't worth the hassle!

FYI -- one of the niftyest little antennas is the half-quadrifilar helix that Garmin provides with the GPSII/III (which is similar to the 45/48 antenna). I have dissected one and it consists of a small piece of thin PCB material formed into a cylinder about .5" diameter x 1.5" long. On the PCB they have printed a full balun & quadrature hybrid driving 4 gamma-matched spiral antennas. This would be a really great "Midnite Reverse Enbgineering" project for someone to tackle!

The thread then turned to patch antennas. The commercial patches are all printed on ceramic with high dielectric constant. The Motorola seems to use epsilon=10 ceramic, which shortens the antenna by a factor sqrt(epsilon)
(the inverse of what is often called the velocity factor). A patch needs elements about a half-wave in size. For epsilon=10, this means that (lambda/2)/sqrt(epsilon) is about 3 cm. There are two common ways to get circular polarization from a patch. One involves the use of a real quad hybrid and two feed-ponts on a square patch. The second scheme uses a rectangular patch. In one dimension, the patch is shorter than a half-wave and hence is inductive. The other dimension is long and hence capacitive. The trick is to get the two directions excited with a net 90 degree phase difference. This is not a trivial exercise!

On the ceramic patch antennas, the manufacturers usually laser trim the metalization to get the sizes just right. This is made more difficult because the physically shortened structure is a very narrow-band, high-Q structure. The antennas typically have a bandwidth ~5 MHz -- good for suppressing RFI, but a bitch to tune!

I first realized just how twitchy the antennas were when I was testing a Ball Bros. spacecraft antenna printed on epsilon=4 or 5 ceramic (and hence ~2" in size). I was concerned with the properties of the plastic radome they provided -- as I recall, it was made of thin Lexan and I was concerned with its properties in vaccuum when exposed to UV. The antenna had ~5 MHz bandwidth. Popping off the radome raised the resonant frequency by 10-15 MHz, making it totally useless for GPS!

Related to this is an anecdotal report I had on the early Garmin GPS 38/40 with an epsilon=10 patch built into the plastic case. One batch of the receivers had very poor sensitivity which the grapevine reported was due to manufacturing tolerance problems in the plastic case.

In addition to being very narrow-band, the dielectrically loaded patch antennas tend to be more lossy than their full-sized relatives. This is why a small patch MUST have a good LNA built into it.

The high-Q and loss problems are the reason that I always make the recommendation that you will get better weak-signal GPS performance from handheld with external antennas (like the half-quads used in the GPSII/III) than from their patch antenna brethren (like the GPS-12).

And the high-Q, narrow bandwidth characteristic is the reason I tell people not to paint their patch antennas, even if they HATE the color!

Dave Martindale replied to John:
> [snip]
> Other designs: Someone else somewhere on the web suggested building
> an 8-turn helix on ABS DWV (drain waste vent) plumbing pipe. It is
> almost exactly the diameter you need (60 mm) to make the circumference

> one wavelength, and an 8-turn helix makes a nice high-gain antenna.
> Which, if you think about it, is a really dumb idea, because a GPS
> antenna should *not* be directional. Sure enough, there a a deep
> null in the pattern for satellites somewhere around 45 degrees elevation.

YEP, AN 8-TURN HELIX IS A BAAAAAD IDEA! The longer the helix, the more
the directivity it has. But for good GPS performance, you want an all-sky,
low directivity (i.e. low gain) antenna.

> However, someone (Tom?) pointed out that a *two* turn helix isn't
> very directional, and with an MMIC preamp (to compensate for low gain)
> makes a good GPS antenna. I think he made his from a yoghurt container
> and an aluminum pie plate, which is certainly good for low cost. The
> ABS pipe is still an option if you'd like a slightly more robust helix
> form.

See my comments above. The ground plane I used was a 4" square or round
piece of PCB.

> Finally, I've seen another design somewhere on the web for a quadrifilar
> helix antenna made out of thin semi-rigid coax. It also looks like a
> good design, but I don't have the URL handy. Try searching for "gps
> antenna" and "quadrifilar" on the web.

I don't have the reference at hand, but I recall it was published in UKW
Berichte. The author was Matjaz Vidmar, Y53MV. For his PhD thesis, Matjaz
built his own GPS & GLONASS receivers from scratch in ~1991-2. That was at
the
time that Slovenia was in the process of becoming one of the "fission
remnants" of Yugoslavia and Matjaz was able to built the receivers by using
a very clever and original design. Matjaz is now on the faculty at the
Univ.
of Lubljana and has recently been active building most of the receivers for
AMSAT's P3D satellite. His quadrifilar was built of 0.141" semi-rigid coax
plus a BNC or SMA connector.

As a final "work in progress" report -- I mentioned a few weeks ago that
I have developed a very low-cost low multipath choke-ring antenna. Just
tonite, I finished the "final" version and it is working this very minute.
FYI -- it uses the ~$50 Motorola antenna I mentioned above plus < $20 in
parts available at your local hardware and kitchen-ware stores. The only
tools needed are a drill and a pop-rivet tool. It mounts on a standard
surveyor's tripod (i.e. 5/8"-11 thread) and should be able to last in the
weather! I have digital photos documenting the construction, but I have
not yet written the descriptive text -- perhaps I will finish over the
Xmas holidays.

12. Re: [TACGPS:1920] Re: GPS Antennae designs...

From: "Ira A. Wilner" <bdcst@vermontel.net>
Date: Mon, 30 Nov 1998 08:39:20 -0500
To: tacgps@tapr.org
Message-ID: <3662A008.3BA55EEB@vermontel.net>
Rendered body type: text/plain

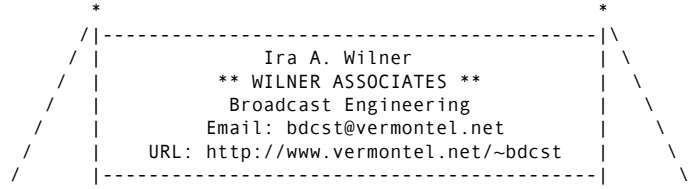
Hi Tom,

I enjoyed your writup about your GPS antenna exploits and I wait with
baited breath for your Motorola-97 patch antenna choke ring assembly.

However, I want to point out that it is possible to build a hand held
GPS receiver with a built in patch antenna that exhibits extraordinarily
good performance.

The Lowrance GM-100 tested by me and other denizens of the
sci.geo.satellite-nav newsgroup proved to be better than any other
consumer grade handheld's to date, even those with adjustable plug-in
helix antennas. And the pickup pattern is so broad that, short of
flipping it on its back, the GM-100 will lock to most birds in any
orientation!

--Ira



13. Re: [TACGPS:1920] Re: GPS Antennae designs...

```
From: Bob Bruninga <bruninga@nadn.navy.mil>
Date: Mon, 30 Nov 1998 10:20:00 -0500 (EST)
To: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Cc: tacgps@tapr.org
Message-ID: <Pine.GSO.4.05L.9811301013430.8099-100000@arctic>
Rendered body type: text/plain
```

On Mon, 30 Nov 1998, Dr Thomas A Clark (W3IWI) wrote:

> In addition to being very narrow-band, the dielectrically loaded patch
> antennas tend to be more lossy than their full-sized relatives. This is
> why a small patch MUST have a good LNA built into it.

Tom, Is it also safe to say that the capture area is down by 3 so
therefore the received power is also down by 3? Or is it 3 squared?
Thus its more than just "loss"?

In otherwords you can never get the same SNR out of a dielectrically
loaded antenna as you can get out of a real one?

bob

14. 1998 ARRL and TAPR DCC Audio, Photos, Abstracts, and More

```
From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Mon, 30 Nov 1998 15:25:13 -0600
To: "HF SIG  list   mailing"<hfsig@tapr.org>, " Spread Spectrum "<ss@tapr.org>,
        " TAPR/AMSAT DSP "<dsp@tapr.org>,
        "APRS SIG  list   mailing"<aprssig@tapr.org>,
        "NETSIG  list   mailing"<netsig@tapr.org>,
        "BBS SIG  list   mailing"<bbssig@tapr.org>,
        " tacgps "<tacgps@tapr.org>, aprsnews, mic-e,
        TAPR Regional Freq <regional_freq@tapr.org>,
        "TAPR-BB  list   mailing"<tapr-bb@tapr.org>
Message-ID: <v04020a06b288bb17413f@[128.83.74.104]>
Rendered body type: text/plain
```

The ARRL and TAPR DCC Web page has been updated to include all recorded
segments from the conference as well as a story and photo section.

Visit: http://www.tapr.org/dcc/

* Listen to sessions from the 1998 ARRL and TAPR DCC over 30 hours covering
        Keynote by Dale Hatfield, W0IFO
                Chief of the FCC's Office of Engineering and Technology
        APRS National Symposium
        Packet Radio Users Group of Japan (PRUG) Technical Seminar
        Technical Paper Presentations
        Introductory Sessions
                Introduction to Spread Spectrum
                Introduction to PIC Development
                Introduction to MMDS/LMDS
        Friday Technical Seminar featuring Don Lemke, WB9MJN on
                Infrastructureless Packet Radio Networks
        Sunday Technical Seminars featuring:
                Lyle Johnson, WA7GXD -
                        RUDAK digital communications system
                Tim Shepard, KD1YK -
                        Packet Radio Networks with Millions or Billions of
Stations

* 1998 Conference Overview Story

* Look at photos from the 1998 ARRL and TAPR DCC

* Review Abstracts from 1998 Proceedings

* Check out past Digital Communication Conferences Audio and Abstracts

as of now, the 1999 ARRL and TAPR DCC will be hosted in Phoenix, AZ in Sept
'99. More information will be posted once a date and location has been
decided.

Tucson Amateur Packet Radio
8987-309 E Tanque Verde Rd #337 * Tucson, Az * 85749-9399

```
e-mail: tapr@tapr.org       web: <http://www.tapr.org/>
ftp:    ftp.tapr.org
phone:  940-383-0000        fax: 940-565-2544
------------------------------------------------------------------------------
```

15. Re: [TACGPS:1922] Re: GPS Antennae designs...

```
From: "Ira A. Wilner" <bdcst@vermontel.net>
Date: Mon, 30 Nov 1998 17:23:28 -0500
To: tacgps@tapr.org
Message-ID: <36631AE0.93E7300D@vermontel.net>
Rendered body type: text/plain
```

Bob Bruninga wrote:
>
> In otherwords you can never get the same SNR out of a dielectrically
> loaded antenna as you can get out of a real one?

My $.02:

It follows that the smaller the capture area, i.e. active elements or
reflector, the less RF is intercepted and the weaker the acquired signal
will be.

--Ira

16. Re: [TACGPS:1922] Re: GPS Antennae designs...

```
From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Tue, 01 Dec 1998 03:41:00 +0000
To: tacgps@tapr.org
Message-ID: <3663654C.A3BC6477@clark.net>
Rendered body type: text/plain
```

Bob Bruninga asked:
>
> On Mon, 30 Nov 1998, Dr Thomas A Clark (W3IWI) wrote:
>
> > In addition to being very narrow-band, the dielectrically loaded patch
> > antennas tend to be more lossy than their full-sized relatives. This is
> > why a small patch MUST have a good LNA built into it.
>
> Tom, Is it also safe to say that the capture area is down by 3 so
> therefore the received power is also down by 3? Or is it 3 squared?
> Thus its more than just "loss"?
>
> In otherwords you can never get the same SNR out of a dielectrically
> loaded antenna as you can get out of a real one?

Not really -- the concept of "capture area" really only applies to
antennas bigger the ~one wavelength in size. For small antennas, the
capture area is really a measure of the directivity of the antenna,
and even an infinitesimal dipole has nearly the same directivity
as a half-wave dipole, and both have a capture area ~ 0.12 lambda**2
when hung in free-space. Any of the patch antennas we have been discussing
are essentially half-wave dipoles, and they are used over a ground-
plane (which screens out half the universe), so they have something like
0.25 lambda**2 of "area". BTW, the same argument applies to small
magnetic loop antennas.

The problem with under-sized antennas (like the NSS VLF poles across the
river) is getting enough current to flow in the structure in an antenna
that has nearly zero radiation resistance (dominated by the capacitive
reactance).

Aside: In mathematical terms, the directivity G of an antenna is given by

```
          4*pi*Aeq
      G= ----------
         lambda**2
```

where Aeq is the equivalent collecting area.

Take the antenna pattern and integrate it over the full 4*pi steradians
of sky = beam solid angle (usually written as a Capital Omega). The
antenna's
directivity is then

```
         (4*pi steradians in the whole sky)
      G= ----------------------------------
          (Cap Omega = beam solid angle)
```

or Aeq= (lambda**2)/(Cap Omega)

73, Tom

17. Re: [TACGPS:1922] Re: GPS Antennae designs...

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Tue, 01 Dec 1998 03:58:52 +0000
To: tacgps@tapr.org
Message-ID: <3663697C.CABAFCDB@clark.net>
Rendered body type: text/plain

Last night I mentioned that I didn't know where my copy of the drawing
for the quadrifilar helix built by Matjaz Vidmar (S53MV) from Slovenia.

I found it tonite and scanned it for you. The attached drawing is in GIF
format. All dimensions are in millimeters (except for the 0.141" semi-
rigid coax). The 1.80 mm wire diameter shown shouldn't be too critical.
You can probably use AWG #12 or #14, or small brass welding rod.

You will see from the drawing that you will need 4 pieces of wire,
with 2@ 100 mm=3.94" and 2@ 105 mm=4.13" length. You might find it easier
to use two pieces twice this length, since the bottom end solders to
the coax. Note that you have to form the 4 pieces of wire into half-
turn twists, and that the helix sections are wound with a left-hand
twist to make RCP. This is not an error because the antenna is a back-
fire helix.

If you try to analyze the antenna, the 5 cm height from the lower solder
joints to the feedpoint serves as a balun for the 0.141" coax. The
extra length of the 0.141" semi-rigid coax is arbitrary.

I see no reason that you couldn't mount a MMIC LNA at the feedpoint.
An ERA-3 would give ~20 dB of gain.

Have fun and report back if you try the design!

73, Tom
[Attachment: matjaz.gif; image/gif; 60,389 bytes]

December 1998

Original source file: tacgps.9812
Source: http://ftp.tapr.org/product_docs/TAC2/mail_archives/tacgps.9812

1. GPS Antenna design drawings and photos

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Tue, 01 Dec 1998 14:32:44 +0000
To: tacgps@tapr.org
Message-ID: <3663FE0C.F7C8F65F@clark.net>
Rendered body type: text/plain

Some people had problems with my atachment of a GIF image to
Email. Sorry.

To solve the problem, I have put the drawing on my FTP server at URL:
      ftp://aleph.gsfc.nasa.gov/GPS/antennas/matjaz_quad.gif

In that same directory on aleph are some JPEG photos concerning choke-
ring antennas:

$30,000+ of commercial geodetic choke-ring antennas I collected for
recent anechoic chamber tests. This collection is from 4 of the 5
manufacturers of (nearly) identical antennas cloned from a JPL design.
These are typical of the antennas used at most of the IGS and CORS
sites. They are ~14.5" in diameter, and are milled from a solid
15" x 15" x 4" block of aluminum. For scale, the grooves have 1"
width and are 2.5" deep. One of my research activities concerns the
calibration of the phase center at the mm-level.
      ftp://aleph.gsfc.nasa.gov/GPS/antennas/6_choke_ants.jpg

My original prototype of an 8" choke-ring antenna. In this photo, the
Motorola patch antenna is NOT centered properly. This antenna used ~$10
in parts and had an excellent pattern on the anechoic chamber antenna
range:
      ftp://aleph.gsfc.nasa.gov/GPS/antennas/choke_proto.jpg

Finally -- some pictures of my new 10" choke-ring antenna finished just
last weekend. This antenna has one more ring than the 8" prototype and
involves ~$20 in parts & materials. Itook some extra care to make the
antenna more rugged (lots of pop rivets!) and weather-proof (all the
galvanized steel parts have been primed with zinc primer, and then
painted:

  Some suitable parts that might be used -- all from the local hardware
  or kitchen supply stores:
      ftp://aleph.gsfc.nasa.gov/GPS/antennas/parts.jpg

  I chose to use the 10" teflon-coated pan and not to use the aluminum
  baking pans. The chosen parts are shown stacked up, before drilling
  any holes:
      ftp://aleph.gsfc.nasa.gov/GPS/antennas/choke_asm.jpg

  After drilling all the holes. The larger holes are 5/8" diameter (for
  the tripod mounting bolt, and to pass the coax & connector thru), and
  the smaller holes are 1/8" (for pop rivets):
      ftp://aleph.gsfc.nasa.gov/GPS/antennas/holes.jpg

  And the final antenna, after painting, pop riveting, etc. on my Zeiss
  surveying tripod on the back porch, actually collecting data! [I found
  this nearly new tripod worth > $1k on surplus for $75. One of my
  better purchases!]:
      ftp://aleph.gsfc.nasa.gov/GPS/antennas/tripod.jpg

73, Tom

2. Re: [TACGPS:1927] GPS Antenna design drawings and photos

From: "Ira A. Wilner" <bdcst@vermontel.net>
Date: Tue, 01 Dec 1998 15:46:45 -0500
To: tacgps@tapr.org
Message-ID: <366455B5.57DFDF@vermontel.net>
Rendered body type: text/plain

Dr Thomas A Clark (W3IWI) wrote:
>
> Some people had problems with my atachment of a GIF image to
> Email. Sorry.

(SNIP)

This may be a silly question, but I didn't notice any drain holes in the
choke ring assembly. Are the pop rivets doubling as drains?

While that might not be an issue in New Mexico, here in New England one
would run the risk of creating a bird bath. Now how would that affect
performance?

--Ira
 W1IRA

3. Re: [TACGPS:1925] Re: GPS Antennae designs...

From: "Ira A. Wilner" <bdcst@vermontel.net>
Date: Tue, 01 Dec 1998 16:09:02 -0500
To: tacgps@tapr.org, tac@clark.net
Message-ID: <36645AEE.ED432CCA@vermontel.net>
Rendered body type: text/plain

Dr Thomas A Clark (W3IWI) wrote:

> Not really -- the concept of "capture area" really only applies to
> antennas bigger the ~one wavelength in size. For small antennas, the
> capture area is really a measure of the directivity of the antenna,
> and even an infinitesimal dipole has nearly the same directivity
> as a half-wave dipole, and both have a capture area ~ 0.12 lambda**2
> when hung in free-space.

Okay, then what about isotropic antennas, i.e. 1/4 wave ground plane
versus foreshortened whips such as spirally wound rubber duckies? They
all have the same directivity of a hemispherical radiator.

Is the lack of antenna efficiency of the duckie due to low radiation
resistance, reactive or dielectric losses or is it due to significant
reduction in its aperture?

Tom, your statement would seem to imply that aperture in a fractional
lambda antenna is unimportant and it is the very low radiation
resistance value that makes it difficult to generate a meaningful signal
voltage on receive and would cause significant IR losses on transmit.

But what about the relationship between aperture size and the amount of
RF field that is intercepted. Is that only valid for greater than 1
wavelength? It is a bit counter intuitive when one visualizes magnetic
lines of force or electric fields being intercepted by a conductor.

--Ira

4. Re: [TACGPS:1928] Re: GPS Antenna design drawings and photos

From: "Steve Sampson" <ssampson@usa-site.net>
Date: Tue, 1 Dec 1998 18:21:47 -0600
To: <tacgps@tapr.org>
Message-ID: <001a01be1d89$bfd847a0$87228cd1@dodge.usa-site.net>
Rendered body type: text/plain

Actually, if I put that uncovered in my yard, about 20 birds would
be duking it out for ownership :-)

I'm thinking a nice clamp and a garbage bag...

Steve

-----Original Message-----
From: Ira A. Wilner <bdcst@vermontel.net>
To: tacgps@tapr.org <tacgps@tapr.org>
Date: Tuesday, December 01, 1998 3:32 PM
Subject: [TACGPS:1928] Re: GPS Antenna design drawings and photos

>This may be a silly question, but I didn't notice any drain holes in the
>choke ring assembly. Are the pop rivets doubling as drains?
>
>While that might not be an issue in New Mexico, here in New England one
>would run the risk of creating a bird bath. Now how would that affect

>performance?

5. Re: GPS Antenna design drawings and photos

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Wed, 02 Dec 1998 05:17:07 +0000
To: tacgps@tapr.org
Message-ID: <3664CD53.65B36ECE@clark.net>
Rendered body type: text/plain

Ira Wilner asked about drain holes and Steve Sampson noted:
> Actually, if I put that uncovered in my yard, about 20 birds would
> be duking it out for ownership :-)

I didn't put drain holes in at this time -- not that I didn't consider it,
but my intent is to cover the antenna with a radome. On the next trip to
the
pots 'n pans store, I'm looking for a vinyl bowl about 11" in diameter
(i.e.
Tupperware). The largest one my wife has in our stock is a tad too small
for the large 10" ring.

The use of radomes is very common practice at the IGS sites. If you look at
      ftp://aleph.gsfc.nasa.gov/GPS/antennas/gode-ant.jpg
you will see the choke-ring antenna sitting under a hemispheric plexiglas
radome atop the 30" diameter concrete pier. The antenna you see in the
foreground is my GODE IGS GPS site (which is also in use as the GODZ
GPS+GLONASS facility for the current IGEX campaign).

If you look closely at the radome, you will see that there are charcoal
briquettes (throw some shrimp on the barbie, mate!) under the dome.
These help absorb condensation. The light bulbs provide some heat to
keep the condensation under control, act as a nite-light, and mark the
antenna so that snow-plow drivers don't hit it during the winter! Next
to the light you also see a small Rotron fan that keeps the air inside
gthe radome "stirred up".

FYI in this photo -- background right is our 5M geodetic VLBI dish. This
used
to be a mobile antenna that toured the western US, Alaska, Canada and
Europe
about a decade ago in the pre-GPS era. The antenna dish is a clone of the
dish flown on Voyager to the outer planets and we use it at S & X-band.
We also use this antenna as an az-el platform for fake spacecraft to test
out GPS attitude determination widgets. [And it has also been used for 432
EME and I hope to be QRV on 10.4 GHz soon.]

The near trailer houses my GPS hardware and is where much of the original
TAC
testing was done. The far trailer has the VLBI hardware and Hydrogen Maser.
The 30' tower next to the GPS trailer has the W3IWI-13 DGPS beacon antenna
on top.

73, Tom

6. Re: [TACGPS:1929] Re: GPS Antennae designs...

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Wed, 02 Dec 1998 05:53:45 +0000
To: tacgps@tapr.org
Message-ID: <3664D5E9.A049AC9E@clark.net>
Rendered body type: text/plain

Ira Wilner wrote (and Bob Bruninga sent similar comments):
> > Not really -- the concept of "capture area" really only applies to
> > antennas bigger the ~one wavelength in size. For small antennas, the
> > capture area is really a measure of the directivity of the antenna,
> > and even an infinitesimal dipole has nearly the same directivity
> > as a half-wave dipole, and both have a capture area ~ 0.12 lambda**2
> > when hung in free-space.
>
> Okay, then what about isotropic antennas, i.e. 1/4 wave ground plane
> versus foreshortened whips such as spirally wound rubber duckies? They
> all have the same directivity of a hemispherical radiator.

A quarter-wave ground-plane is NOT an isotropic antenna! You know that
because there is a null off the tip!

> Is the lack of antenna efficiency of the duckie due to low radiation
> resistance, reactive or dielectric losses or is it due to significant
> reduction in its aperture?

The Rubber Ducky antennas (some time I'll have to tell you how that term
originated. I take claim to its "invention" circa 1961.) are poor
radiators mainly because of the fact that their internal ohmic losses
dominate the radiation resistance, and hence they make heat, not RF.

> Tom, your statement would seem to imply that aperture in a fractional
> lambda antenna is unimportant and it is the very low radiation
> resistance value that makes it difficult to generate a meaningful signal
> voltage on receive and would cause significant IR losses on transmit.
>
> But what about the relationship between aperture size and the amount of
> RF field that is intercepted. Is that only valid for greater than 1
> wavelength? It is a bit counter intuitive when one visualizes magnetic
> lines of force or electric fields being intercepted by a conductor.

The concept of "capture area" really refers to the physical area that
"feels" the currents in the antenna. One simple example -- you put up
a wire dipole antenna for 80M using #18 wire. The antenna is a half-wave
long, but the wire is about 1 mm in diameter, i.e. the "width" is about
1/10,000 wavelength. Therefore the PHYSICAL capture area of this antenna
is ~1/20,000 lambda**2, right? Now let me double the diameter using #12
or #14 wire and I've doubled the physical area. But the 2nd antenna is
indistinguishably different from the one made with #18 (except that the
ohmic losses are a bit less and it may stand up to the weather better).
Both have the same patterns, and hence the same equivalent capture areas,
which is in fact ~.1-.2 lambda**2.

For any dipole (or ground-plane, or rubber ducky, or whatever), the
feed has a complex impedance Z = Rloss + Rradiation +jX. The signal
that the antenna makes is the vector sum of the I*Rradiation contrib-
utions from each little piece of the antenna.

If an antenna has ohmic Rloss terms bigger than Rradiation, then the
antenna gets hot. If the reactive X part is big compared to Rradiation,
then you have an capacitor/inductor, not an antenna!

The term "capture area" has a very precise definition in terms of
the directivity of the antenna, and hence the antenna pattern. Hence
my statement that a microscopic dipole has (nearly) the same capture
area as a half-wave dipole. You may not be able to get enough current
to flow to make the antenna be useful. The problem with
short antennas is getting enough current to flow into the Radiation
Resistance (i.e. matching).

73, Tom

7. Re: [TACGPS:1931] Re: GPS Antenna design drawings and photos

From: "Sam Guccione" <sguccion@outland.dtcc.edu>
Date: Wed, 2 Dec 1998 09:52:35 -0500
To: <tacgps@tapr.org>
Message-ID: <003401be1e03$66e93fd0$18807b8a@t-s103-01.dtcc.edu>
Rendered body type: text/plain

Dr. Clark,

Where is the site identified in the web address? Goddard or elsewhere.

Sam

-----Original Message-----
From: Dr Thomas A Clark (W3IWI) <tac@clark.net>

Date: Wednesday, December 02, 1998 12:50 AM
Subject: [TACGPS:1931] Re: GPS Antenna design drawings and photos

>
>The use of radomes is very common practice at the IGS sites. If you look at
>   ftp://aleph.gsfc.nasa.gov/GPS/antennas/gode-ant.jpg
>you will see the choke-ring antenna sitting under a hemispheric plexiglas
>radome atop the 30" diameter concrete pier. The antenna you see in the
>foreground is my GODE IGS GPS site (which is also in use as the GODZ
>GPS+GLONASS facility for the current IGEX campaign).
>

8. Re: [TACGPS:1933] Re: GPS Antenna design drawings and photos

From: "Dr Thomas A Clark (W3IWI)" <clark@tomcat.gsfc.nasa.gov>
Date: Wed, 02 Dec 1998 12:43:59 -0500
To: tacgps@tapr.org
Message-ID: <36657C5F.1367EF20@tomcat.gsfc.nasa.gov>
Rendered body type: text/plain

Sam Guccione wrote:

> Where is the site identified in the web address? Goddard or elsewhere.

Hi Sam -- the site is at the Goddard Geophysical & Astronomical Obsv.
(GGAO), about 3 miles northeast of the main Goddard campus.

73, Tom

9. RE: [TACGPS:1928] Re: GPS Antenna design drawings and photos

From: "Barry Campbell" <scti@eclipse.net>
Date: Wed, 2 Dec 1998 16:44:27 -0500
To: <tacgps@tapr.org>
Message-ID: <001701be1e3c$ef72c5e0$225bfccc@scti97.raritanval.edu>
Rendered body type: text/plain

Couldn't resist a thought on Ira's question. It's
not a silly question, but conjures up thoughts of
maybe it could double as a rain gauge? How about
when it snows? Could be a nice ice rink or snow
track for birds!
   Seriously, if drain holes are a problem to the
antenna, you might be able to pick up one of those
plastic curved devices used to thwart squirrels
from bird feeders to put over the antenna. The
clear plastic should deflect rain, snow, etc. from
the antenna but not interfere with the reception.
Actually, if it were black plastic, even snow
would not accumulate for long as the sun could
melt it faster against the black.
   I also have a roll of about 3 inch wide copper
that is a total of about 30 feet in length I
bought at Dayton. I wonder if that would serve as
the concentric antenna parts? They could easily be
soldered to a copper base, too.
Anyway, that's my $0.02 worth.
Barry Campbell, W2CGX in New Jersey
barryc@compubell.com

> -----Original Message-----
> From: tacgps@tapr.org
> [mailto:tacgps@tapr.org]On Behalf Of
> Ira A. Wilner
> Sent: Tuesday, December 01, 1998 4:11 PM
> To: tacgps@tapr.org
> Subject: [TACGPS:1928] Re: GPS Antenna
> design drawings and photos
>
>
> Dr Thomas A Clark (W3IWI) wrote:
> >
> > Some people had problems with my
> atachment of a GIF image to
> > Email. Sorry.
>
> (SNIP)
>
> This may be a silly question, but I
> didn't notice any drain holes in the
> choke ring assembly. Are the pop
> rivets doubling as drains?
>
> While that might not be an issue in New
> Mexico, here in New England one
> would run the risk of creating a bird
> bath. Now how would that affect
> performance?
>
> --Ira
> W1IRA
>
>

10. Re: [TACGPS:1932] Re: GPS Antennae designs...

From: "Ira A. Wilner" <bdcst@vermontel.net>
Date: Wed, 02 Dec 1998 23:24:29 -0500
To: tacgps@tapr.org
Message-ID: <3666127D.12A6AD43@vermontel.net>
Rendered body type: text/plain

Dr Thomas A Clark (W3IWI) wrote:
>
> A quarter-wave ground-plane is NOT an isotropic antenna! You know that
> because there is a null off the tip!

Okay. Then it is almost isotropic as in slightly pregnant.

>
> The Rubber Ducky antennas (some time I'll have to tell you how that term
> originated. I take claim to its "invention" circa 1961.) are poor
> radiators mainly because of the fact that their internal ohmic losses
> dominate the radiation resistance, and hence they make heat, not RF.

Then the common joke about them being resistors or dummyloads is indeed
technically correct!

I guess we'll have to wait for the development of cryogenically cooled
HT antennas. :-)

--Ira

11. Re: Rubber Ducky

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Thu, 03 Dec 1998 07:15:58 +0000
To: "James L. Johnson" <jjjohnson@saiph.hpl.hp.com>, TACGPS <tacgps@tapr.org>
Message-ID: <36663AAD.ACA95BB9@clark.net>
Rendered body type: text/plain

Jim Johnson, W6SC wrote:

>   I'd like to hear the story of the rubber ducky term.

OK -- here it is. Naming the "Rubber Ducky" is one of my dubious claims
to fame.

The year was 1961. JFK was in the White House. Young RFK had been
named as Attorney General. A comedian named Vaughn Meador put out an
album (33 RPM, in vinyl) that was a parody on life at 1600 Pennsylvania.
In it was a skit with RFK and JFK acting childish in a bathtub, having
a fight over the possesion of rubber ducky toy.

At the time I was in college in Boulder and had become the Boulder
County RACES Radio Officer. The state of Colorado delivered us a batch
of Motorola portable radios crystalled on 2M. Of course, they were
equipped with the curly whip antennas.

I made a joke something like "Those must be RFK's Rubber Duckys".
Everyone broke out laughing, especially because Colorado had been
staunch Nixon turf. Someone else said something like "Actually it
is baby RFK's little rubber dicky!" The name stuck.

And that's the truth!

73, Tom

12. RE: [TACGPS:1937] Re: Rubber Ducky

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Thu, 3 Dec 1998 06:39:47 -0500
To: <tacgps@tapr.org>
Message-ID: <000001be1eb1$a1011540$101161cf@rick.cnssys.com>
Rendered body type: text/plain

Tom,

I still have that original 33 RPM vinyl, in case you want a copy. Everyone
put them away after JFK was shot so it has low hours. Later, the younger
generation couldn't understand the jokes.

Rick
WB2TNL

-----Original Message-----

From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Dr Thomas A Clark (W3IWI)
Sent: Thursday, December 03, 1998 2:23 AM
To: tacgps@tapr.org
Subject: [TACGPS:1937] Re: Rubber Ducky

Jim Johnson, W6SC wrote:

> I'd like to hear the story of the rubber ducky term.

OK -- here it is. Naming the "Rubber Ducky" is one of my dubious claims to fame.

The year was 1961. JFK was in the White House. Young RFK had been named as Attorney General. A comedian named Vaughn Meador put out an album (33 RPM, in vinyl) that was a parody on life at 1600 Pennsylvania. In it was a skit with RFK and JFK acting childish in a bathtub, having a fight over the possesion of rubber ducky toy.

At the time I was in college in Boulder and had become the Boulder County RACES Radio Officer. The state of Colorado delivered us a batch of Motorola portable radios crystalled on 2M. Of course, they were equipped with the curly whip antennas.

I made a joke something like "Those must be RFK's Rubber Duckys". Everyone broke out laughing, especially because Colorado had been staunch Nixon turf. Someone else said something like "Actually it is baby RFK's little rubber dicky!" The name stuck.

And that's the truth!

73, Tom

13. Re: [TACGPS:1938] Re: Rubber Ducky

From: "Steve Sampson" <ssampson@usa-site.net>
Date: Thu, 3 Dec 1998 07:01:15 -0600
To: <tacgps@tapr.org>
Message-ID: <002a01be1ebd$02f02f60$87228cd1@dodge.usa-site.net>
Rendered body type: text/plain

As I recall, you had to know the current events, otherwise it made little sense. Didn't it have some lady in a box-hat on the Album cover? Before my time, but remember it being listened to as a kid. And I certainly couldn't have remembered the comedians name.

One of the local Hams bought one of those MFJ SWR Analyzers, and everyone brought their antennas to be analyzed. One old guy who's been using his ducky for years found that it was an "open!"

Ha, he didn't expect much, so was satisfied. Fixed it up and he was a new man...

Steve
N5OWK

-----Original Message-----
From: Richard M. Hambly <rick@cnssys.com>
To: tacgps@tapr.org <tacgps@tapr.org>
Date: Thursday, December 03, 1998 6:02 AM
Subject: [TACGPS:1938] Re: Rubber Ducky

>Tom,
>
>I still have that original 33 RPM vinyl, in case you want a copy. Everyone
>put them away after JFK was shot so it has low hours. Later, the younger
>generation couldn't understand the jokes.
>
>Rick
>WB2TNL

14. Re: [TACGPS:1938] Re: Rubber Ducky

From: John Ackermann <jra@febo.com>
Date: Thu, 03 Dec 1998 08:01:36 -0500
To: tacgps@tapr.org
Message-ID: <199812031301.IAA28816@meow.febo.com>
Rendered body type: text/plain

Hi Rick --

You opened up a dangerous door here --

I'm a fan of old comedy, and especially old political comedy. I'd love a
tape copy if you're up to it!!! (One of my prize possessions is Pat
Paulsen's album from the '68 campaign).

73,
John N8UR
jra@febo.com

In message <000001be1eb1$a1011540$101161cf@rick.cnssys.com>, "Richard M. Hambly
" writes:
>Tom,
>
>I still have that original 33 RPM vinyl, in case you want a copy. Everyone
>put them away after JFK was shot so it has low hours. Later, the younger
>generation couldn't understand the jokes.
>
>Rick
>WB2TNL
>
>-----Original Message-----
>From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Dr Thomas A
>Clark (W3IWI)
>Sent: Thursday, December 03, 1998 2:23 AM
>To: tacgps@tapr.org
>Subject: [TACGPS:1937] Re: Rubber Ducky
>
>
>Jim Johnson, W6SC wrote:
>
>>   I'd like to hear the story of the rubber ducky term.
>
>OK -- here it is. Naming the "Rubber Ducky" is one of my dubious claims
>to fame.
>
>The year was 1961. JFK was in the White House. Young RFK had been
>named as Attorney General. A comedian named Vaughn Meador put out an
>album (33 RPM, in vinyl) that was a parody on life at 1600 Pennsylvania.
>In it was a skit with RFK and JFK acting childish in a bathtub, having
>a fight over the possesion of rubber ducky toy.
>
>At the time I was in college in Boulder and had become the Boulder
>County RACES Radio Officer. The state of Colorado delivered us a batch
>of Motorola portable radios crystalled on 2M. Of course, they were
>equipped with the curly whip antennas.
>
>I made a joke something like "Those must be RFK's Rubber Duckys".
>Everyone broke out laughing, especially because Colorado had been
>staunch Nixon turf. Someone else said something like "Actually it
>is baby RFK's little rubber dicky!" The name stuck.
>
>And that's the truth!
>
>73, Tom

15. Re: [TACGPS:1938] Re: Rubber Ducky

From: "Ira A. Wilner" <bdcst@vermontel.net>
Date: Thu, 03 Dec 1998 11:44:34 -0500
To: tacgps@tapr.org
Message-ID: <3666BFF2.B3BBD83A@vermontel.net>
Rendered body type: text/plain

Richard M. Hambly wrote:
>
> Tom,
>
> I still have that original 33 RPM vinyl, in case you want a copy. Everyone
> put them away after JFK was shot so it has low hours. Later, the younger
> generation couldn't understand the jokes.

So do I. Maybe it should be dubbed to CD-R for safe keeping. :-)

--Ira

16. Re: [TACGPS:1937] Re: Rubber Ducky

From: "Ira A. Wilner" <bdcst@vermontel.net>
Date: Thu, 03 Dec 1998 11:56:36 -0500
To: tacgps@tapr.org
Message-ID: <3666C2C4.7B65A418@vermontel.net>
Rendered body type: text/plain

Dr Thomas A Clark (W3IWI) wrote:
>
> The year was 1961. JFK was in the White House. Young RFK had been
> named as Attorney General. A comedian named Vaughn Meador put out an
> album (33 RPM, in vinyl) that was a parody on life at 1600 Pennsylvania.
> In it was a skit with RFK and JFK acting childish in a bathtub, having
> a fight over the possesion of rubber ducky toy.

Actually it was a rubber swan.

As an additional historical footnote:

The recording session was held during the height of the Cuban Missle Crisis. And the producers were worried that the live studio audience would not be in a good humor. It was quite a frightful time. But the audience was very appreciative of the performance, demonstrated by the great laugh tracks they provided.

--Ira
W1IRA

17. Re: [TACGPS:1939] Re: Rubber Ducky

From: "Ira A. Wilner" <bdcst@vermontel.net>
Date: Thu, 03 Dec 1998 11:59:03 -0500
To: tacgps@tapr.org
Message-ID: <3666C357.6ACDFB3D@vermontel.net>
Rendered body type: text/plain

Steve Sampson wrote:
>
> As I recall, you had to know the current events, otherwise it made
> little sense. Didn't it have some lady in a box-hat on the Album cover?
> Before my time, but remember it being listened to as a kid.

No hats! In fact JFK was the first President in modern times to go bare headed even in winter. The clothing industry was distraught over it. It hurt haberdashers!

A nurse and a Caroline Kennedy impostor are the only bonnet wearers on the album cover.

It still elicits a chuckle from me. So, Steve you are making me feel old!

>
> One of the local Hams bought one of those MFJ SWR Analyzers,
> and everyone brought their antennas to be analyzed.

I've used one in hobby and commercial applications. Mighty Fine Junk. Actually one of their better products. In fact so good, that they have come out with a newer version with more bells and whistles. Apparently a best seller for them.

--Ira

18. Re: [TACGPS:1931] Re: GPS Antenna design drawings and photos

From: "Ira A. Wilner" <bdcst@vermontel.net>
Date: Thu, 03 Dec 1998 12:13:09 -0500
To: tacgps@tapr.org
Message-ID: <3666C6A5.D3394341@vermontel.net>
Rendered body type: text/plain

Dr Thomas A Clark (W3IWI) wrote:
>
> FYI in this photo -- background right is our 5M geodetic VLBI dish. This
> used
> to be a mobile antenna that toured the western US, Alaska, Canada and
> Europe
> about a decade ago in the pre-GPS era. The antenna dish is a clone of the
> dish flown on Voyager to the outer planets and we use it at S & X-band.

That cassegrain feed dish looks rather heavy for a spacecraft antenna!

-iw

19. Re: [TACGPS:1937] Re: Rubber Ducky

From: Jim Johnson <jjjohnson@saiph.hpl.hp.com>
Date: Thu, 03 Dec 1998 9:34:48 PST
To: tacgps@tapr.org
Message-ID: <199812031734.JAA07204@saiph.hpl.hp.com>
Rendered body type: text/plain

> >   I'd like to hear the story of the rubber ducky term.
>
> OK -- here it is. Naming the "Rubber Ducky" is one of my dubious claims
> to fame.
>
> The year was 1961. JFK was in the White House. Young RFK had been
> named as Attorney General. A comedian named Vaughn Meador put out an
> album (33 RPM, in vinyl) that was a parody on life at 1600 Pennsylvania.
> In it was a skit with RFK and JFK acting childish in a bathtub, having
> a fight over the possesion of rubber ducky toy.
>
> At the time I was in college in Boulder and had become the Boulder
> County RACES Radio Officer. The state of Colorado delivered us a batch
> of Motorola portable radios crystalled on 2M. Of course, they were
> equipped with the curly whip antennas.
>
> I made a joke something like "Those must be RFK's Rubber Duckys".
> Everyone broke out laughing, especially because Colorado had been
> staunch Nixon turf. Someone else said something like "Actually it
> is baby RFK's little rubber dicky!" The name stuck.
>
> And that's the truth!
>
> 73, Tom
>
>

Thanks, Tom. An interesting story, but I don't think it will
make it into the staid publication QST (!). Of all your
accomplishments, I wonder if this will be listed in your
Top Ten!

73,
Jim W6SC
jjohnson@hpl.hp.com

20. Re: [TACGPS:1938] Re: TAC32

From: Jim Johnson <jjjohnson@saiph.hpl.hp.com>
Date: Thu, 03 Dec 1998 9:37:54 PST
To: tacgps@tapr.org
Message-ID: <199812031737.JAA07466@saiph.hpl.hp.com>
Rendered body type: text/plain

Hi Rick,

   Haven't heard much about further beta releases of TAC32.
Can we assume the next production release is imminent? It
runs flawlessly here in Silicon Valley on WinNT and Win95.

Tnx,
Jim W6SC

21. RE: [TACGPS:1946] Re: TAC32

From: "Richard M. Hambly" <rick@cnssys.com>
Date: Thu, 3 Dec 1998 13:04:37 -0500
To: <tacgps@tapr.org>
Message-ID: <000801be1ee7$64732920$101161cf@rick.cnssys.com>
Rendered body type: text/plain

Jim,

I'm not sure what beta release you are running. The current one is Beta 26.
It is a candidate for Version 2.0. I am getting close.

Attached is a Word 97 file with the release summary.

Rick

-----Original Message-----

From: tacgps@tapr.org [mailto:tacgps@tapr.org]On Behalf Of Jim Johnson
Sent: Thursday, December 03, 1998 12:42 PM
To: tacgps@tapr.org
Subject: [TACGPS:1946] Re: TAC32

Hi Rick,

   Haven't heard much about further beta releases of TAC32.
Can we assume the next production release is imminent? It
runs flawlessly here in Silicon Valley on WinNT and Win95.

Tnx,
Jim W6SC
[Attachment: Tac32 Version 2.doc; application/msword; 70,656 bytes]

22. Re: [TACGPS:1947] Re: TAC32

From: Jim Johnson <jjjohnson@saiph.hpl.hp.com>
Date: Thu, 03 Dec 1998 10:53:45 PST
To: tacgps@tapr.org
Message-ID: <199812031853.KAA12034@saiph.hpl.hp.com>
Rendered body type: text/plain

> Jim,
>
> I'm not sure what beta release you are running. The current one is Beta 26.
> It is a candidate for Version 2.0. I am getting close.
>
> Attached is a Word 97 file with the release summary.
>
> Rick
>

OK Rick, I am way behind - I'm using Beta 22. The release notes
printed OK - thanks for the documentation. I'll download Beta 26
now and start it up.

73,
Jim

23. Helical Antenna

From: Darryl Smith <vk2tds@ozemail.com.au>
Date: Fri, 04 Dec 1998 08:51:52 +1100
To: tacgps@tapr.org
Message-ID: <366707F7.B3EB774E@ozemail.com.au>
Rendered body type: text/plain

Dumb question here with the helical antenna.....

        Which way does the coil go....

I built one last night and got poor performance. I just did not want to
re-wind it to get worse perfoemance........

Also how big should the reflecter at the back be? And can it be flat....

Darryl VK2TDS

24. Re: [TACGPS:1949] Helical Antenna

From: John Franke <j.m.franke@larc.nasa.gov>
Date: Thu, 3 Dec 1998 17:24:25 -0500
To: tacgps@tapr.org
Message-ID: <v03130306b28cbf068ed9@[128.155.59.12]>
Rendered body type: text/plain

The turns should be right-handed, like a normal screw thread. The
reflector can indeed be flat, it typically is. The diameter should be 0.8
wavelength or greater. How many turns are you using? More turns mean more
gain but also more directivity. For GPS applications, two turns should be
good, as was used by Tom Clark.

John M. Franke WA4WDL

>Dumb question here with the helical antenna.....
>
>   Which way does the coil go....

>
>I built one last night and got poor performance. I just did not want to
>re-wind it to get worse perfoemance........
>
>Also how big should the reflecter at the back be? And can it be flat....
>
>Darryl VK2TDS

25. Re: [TACGPS:1950] Re: Helical Antenna

From: Donald E Haselwood <k4jpj@appstate.campus.mci.net>
Date: Thu, 03 Dec 1998 19:45:09 -0500
To: tacgps@tapr.org
Message-ID: <3.0.6.32.19981203194509.007c6ad0@appstate.campus.mci.net>
Rendered body type: text/plain

For widest beam width a 1 1/2 turn helix is best. Below 1 1/2t it loses its circularity. Reference (5) shows that 2 turns is minimum on the axial ratio v pitch curve and not the best choice; at 2 1/2 t and above it "smooths out". I don't know how the impedance varies in the 1 1/2 - 3 t range. Reference (5) below says that the impedance is about 70 + j30 ohms over a roughly a 10% bandwidth, providing the helix is radiating circularly (i.e. pitch and dia have to be within the limits). The "amateur" method for matching has been to have a portion of a turn very close to the ground plane, forming a matching line (push the turn towards the ground plane and watch the swr). I've done this on a 70 cm long helix and 6 turn 2.4 Ghz helix--it works fine, but I've never tried the very short type (futhermore, there is the problem of sig source for gps!).

Some time back whilst looking at dish feeds I turned up the following references on short helices. Most of the work was done in the context of arrays of short helixes (for 11 Ghz DBS).

(1) * Nakano, H., Asaka, N., & Yamauchi, J. (1984). Radiation characteristics of short helical antenna and its mutual coupling. Electronics Letters, 20(5), 202-204.

(2) Nakano, H., Asaka, N., & Yamauchi, J. (1984). Short Helical Antenna Array Fed from a Waveguide. IEEE Transactions on Antennas and Propagation, AP-32(8), 836-840.

(3) Nakano, H., Samada, Y., & Yamauchi, J. (1986). Axial mode helical antennas. IEEE Transactions on Antennas and Propogation, AP-34(9), 1143-1148.

(4) Nakano, H., Takeda, H., Kitamura, Y., Mimaki, H., & Yamauchi, J. (1992). Low-profile helical array antenna fed from a radial waveguide. IEEE Transactions on Antennas and Propagation, 40(3), 279-284.

(5) * Nakano, H., Taketa, H., Honma, T., Mimaki, H., & Yamauchi, J. (1991). Extremely Low-Profile Helix Radiating a Circularly Polarized Wave. IEEE Transactions on Antennas and Propogation, 39(6), 754-757.

* - Talks about short helices (whereas others incorporate them into arrays)

73's
Don, W4DH

At 04:26 PM 12/3/98 -0600, you wrote:
>The turns should be right-handed, like a normal screw thread. The
>reflector can indeed be flat, it typically is. The diameter should be 0.8
>wavelength or greater. How many turns are you using? More turns mean more
>gain but also more directivity. For GPS applications, two turns should be
>good, as was used by Tom Clark.
>
>John M. Franke WA4WDL
>
>
>>Dumb question here with the helical antenna.....
>>
>>   Which way does the coil go....
>>
>>I built one last night and got poor performance. I just did not want to
>>re-wind it to get worse perfoemance........
>>
>>Also how big should the reflecter at the back be? And can it be flat....
>>
>>Darryl VK2TDS

>
>
>
>

26. Re: [TACGPS:1927] GPS Antenna design drawings and photos

From: Jeff Vollin <barnie@flash.net>
Date: Fri, 04 Dec 1998 21:43:32 -0700
To: tacgps@tapr.org
Message-ID: <3668B9F3.65FA0BBC@flash.net>
Rendered body type: text/plain

Tom:
  A great piece of work, thanks. Is there anything resonant about the
dimensions
of the choke rings? I believe the choke rings on waveguide flanges are
resonant
cavities, although I can't seem to find a description in any of my
engineering
books. (Ancient stuff I guess. I may have to look it up in the Rad Lab
series.) I was
just about to scale the waveguide choke flange dimensions to 1575 when you
posted
your info.

Jeff Vollin, KC6WFU

Dr Thomas A Clark (W3IWI) wrote:

>
>
> In that same directory on aleph are some JPEG photos concerning choke-
> ring antennas:
>
> $30,000+ of commercial geodetic choke-ring antennas I collected for
> recent anechoic chamber tests. This collection is from 4 of the 5
> manufacturers of (nearly) identical antennas cloned from a JPL design.
> These are typical of the antennas used at most of the IGS and CORS
> sites. They are ~14.5" in diameter, and are milled from a solid
> 15" x 15" x 4" block of aluminum. For scale, the grooves have 1"
> width and are 2.5" deep. One of my research activities concerns the
> calibration of the phase center at the mm-level.

27. Re: [TACGPS:1952] Re: GPS Antenna design drawings and photos

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Sat, 05 Dec 1998 05:28:49 +0000
To: tacgps@tapr.org
Message-ID: <3668C491.729F27A5@clark.net>
Rendered body type: text/plain

Jeff Vollin wrote:
>
> Tom:
>   A great piece of work, thanks. Is there anything resonant about the
> dimensions of the choke rings? I believe the choke rings on waveguide
> flanges are resonant cavities, although I can't seem to find a
> description in any of my engineering books. (Ancient stuff I guess.
> I may have to look it up in the Rad Lab series.) I was just about to
> scale the waveguide choke flange dimensions to 1575 when you posted
> your info.

Yes, the rings are resonant, and should be a quarter-wave deep. Since
each ring are shorted at the bottom, they look like an open-circuit at
the top.

Since 1575 MHz = 19cm, a quarter-wave = 5 cm = 2", hence the reason for
looking for 2" deep pans. The phase center of the feed wants to be
approximately in the plane of the rings, this is the reason that the
1.5" outlet box is about the right height. The center section should
be about a half-wave, hence the 4" diameter outlet box cover used as
a ground-plane. Fortunately, the 2" pans/caps I found are slightly
under-sized, so they really are very close to a quarter-wave deep.
And fortunately none of the dimensions are too critical, so you can
make good use of whatever parts are about the correct size.

I had intended to write a how/why treatise for this project, but haven't
gotten to it yet (maybe over Xmas?). But since there was so much interest
in the project, I decided to go ahead and make the photos public.

FYI -- I'll be away for the next week attending the American Geophysical
Union meeting in SFO, so don't expect any rapid responses/rejoinders.

73, Tom

28. Re: Rubber Ducky

From: "Dr Thomas A Clark (W3IWI)" <tac@clark.net>
Date: Sat, 05 Dec 1998 06:23:33 +0000
To: tacgps@tapr.org
Message-ID: <3668D165.6C448265@clark.net>
Rendered body type: text/plain

I have to make two minor corrections. The album "The First Family"
didn't come out until 1962, so my cronology was slightly incorrect.
The recording session was on Oct.22, 1962.

Also, the comedian's neame is Vaughn Meader (not Meador). All this
was gleaned by looking at a GIF version of the album cover sent to
me by WB2TNL.

A search of http://snap.com for "Vaughn Meader" returns 4 pages of
mostly irrelvant hits, including:

On http://home.pacbell.net/john14/62hi-lites.html you will find the
following item confirming the 1962 date:
>   1962 (15 Dec) Vaughn Meader's "The 1st Family," album goes
>   #1 & stays #1 for 12 wks

On http://metaverse.com/grammy/winners.html you will find that "First
Family" was Album of the Year in 1962, and that Tony Bennett's "I Left
My Heart in SFO" was Record of the Year.

73, Tom

29. Re: [TACGPS:1954] Re: Rubber Ducky

From: Steve Sampson <ssampson@usa-site.net>
Date: Sat, 5 Dec 1998 07:04:24 -0600 (CST)
To: tacgps@tapr.org
Message-ID: <199812051304.HAA18940@access.usa-site.net>
Rendered body type: text/plain

Wow, .. also the Beverly Hillbillys first show, and Evander Hollyfield
was born with two ears!

Steve

>   ----------
>
> A search of http://snap.com for "Vaughn Meader" returns 4 pages of
> mostly irrelvant hits, including:
>
> On http://home.pacbell.net/john14/62hi-lites.html you will find the
> following item confirming the 1962 date:
> >   1962 (15 Dec) Vaughn Meader's "The 1st Family," album goes
> >   #1 & stays #1 for 12 wks
>
> On http://metaverse.com/grammy/winners.html you will find that "First
> Family" was Album of the Year in 1962, and that Tony Bennett's "I Left
> My Heart in SFO" was Record of the Year.
>
> 73, Tom

30. a different sort of antenna

From: Dave Martindale <davem@cs.ubc.ca>
Date: Tue, 8 Dec 1998 11:56:19 -0800
To: tacgps@tapr.org
Message-ID: <l03130301b2932e2384ec@[198.162.38.159]>
Rendered body type: text/plain

I have a somewhat different antenna question. I need a simple, no-tune,
easy-to-build antenna for radiating low power at the L1 frequency.

A couple of years ago I wanted to use an external antenna with my
GPS-38, which has no provision for that. I built a battery-powered 5 V
power supply to provide power to a Trimble active antenna without the

help of the GPS. Then I fed the GPS signal to a simple antenna that could be attached to the top of the GPS with tape or rubber band. The signal is re-radiated by this simple antenna, and picked up the the 38's internal patch antenna. It works quite well - not quite equal to connecting the same antenna directly to a GPS with an antenna jack, but better than the 38's own antenna. A description of my project in more detail can be found at http://vancouver-webpages.com/peter/extant.txt

The original re-radiating antenna I used was a simple full-wave loop: 190 mm of ordinary house wire, probably 14 gauge, bent into a square and fed at the corner with coax. I also tried an "infinite balun" arrangement, making a one-wavelength loop out of RG-174 with the feedpoint half-way around the loop from where the loop is joined. Both of these worked about equally well, with no apparent actual advantage for the infinite balun arrangement.

However, both of these require a certain amount of fiddling to build. I'd like a design that can be reproduced accurately and easily with little work. I tried building a one-wavelength loop on PC board material (single-sided), but even though the loop circumference is the same, it performs significantly worse than the unsupported-wire and coax loops. Now, could this just be losses in the glass-epoxy board material? Or is it that a loop on glass-epoxy has a sufficiently lower velocity of propagation even when one-sided board is used (this isn't microstrip) that I'm now operating well off resonance? I haven't been able to get at 1.6 GHz test equipment so far, so this is all guessing on my part.

Of course I could use any commercial passive antenna, patch or helix or whatever, as my re-radiator. But this is too expensive, and most of them are also too large to tape to the top of a GPS. And I don't really need circular polarization or narrow bandwidth for interference rejection. All I need is a cheap, simple, small, no-tune radiator for 1.575 GHz. What other designs might work well?

A small loop (less than 1/10 wavelength) would be an attractive size, but needs to be tuned to resonance with a capacitor - that doesn't seem practical. A half-wave dipole is possible, but somewhat long. Same goes for a sleeve dipole. I've also seen a commercially-made tiny helical, about 5 mm diameter and 70 mm long, that works well - but apparently those are hand-tuned by pruning wire from the helix while measuring with a network analyzer or something similar.

Can anyone suggest other designs that I should look at? (This probably isn't of interest to the whole list, so email to me is likely more appropriate).

Dave

31. Re: [TACGPS:1956] a different sort of antenna

From: W4OQM@aol.com
Date: Tue, 8 Dec 1998 21:58:34 EST
To: tacgps@tapr.org
Message-ID: <f92f26e9.366de75a@aol.com>
Rendered body type: text/plain

Dave,

Several comments:

I wouldn't give up on the monofilar axial-mode version of the helix (the Kraus coil). One benefit of this type of helix antenna is that it's rather broad-banded. Figure 7-19 [KRAUS] shows that the helix pattern holds up pretty well for +/-25% variation in frequency. For a fixed frequency application like you're talking about, this benefit translates into imprecise construction practices. A 1-1/2 turn helix should do fine. At 1.6 GHz., the helix would be about 2.3 inches in diameter. Not real small, but not large either.

If the re-radiating antenna is taped to the top of the GPS unit, then the re-radiating antenna and the patch antenna in the GPS unit are in each other's near-field. This messes up most predictions about the behavior of the system. I suppose you could mount the re-radiating antenna on the ceiling of the room you have the GPS unit in.

I'm curious about the dimensions that you gave of the commercially made helix. They seem too small to be for 1.6 GHz. Lambda is 18.75 cm, so 5 mm diameter makes C==0.084*lambda. According to figure 7-10 [KRAUS], this would be a normal-mode helix (like the rubber duckie) as opposed to an axial-mode helix (like a satellite antenna).

I'm also curious whether you need to orient the two antennas to prevent
oscillation?

An interesting problem.

73,
Charlie -- W4OQM
c.wells@ieee.org

Reference:

[KRAUS] Kraus, J. D., Antennas, 2nd ed., 1987, McGraw-Hill.

32. Re: [TACGPS:1957] Re: a different sort of antenna

From: Dave Martindale <davem@cs.ubc.ca>
Date: Wed, 9 Dec 1998 00:21:46 -0800
To: tacgps@tapr.org
Message-ID: <l03130301b293e1d1bbe8@[198.162.38.159]>
Rendered body type: text/plain

About the axial mode helix: I've built one of these as an experiment
as a receiving antenna. It does work. It would likely work quite well
attached to the ceiling in a fixed-location application, and a number
of extra turns would make it more directional to concentrate the energy
toward the GPS, even if there was 5 feet of air in between.

But it's really not practical for attaching to a hand-held GPS, even at
only 1.5 turns.

>I'm curious about the dimensions that you gave of the commercially made helix.
>They seem too small to be for 1.6 GHz. Lambda is 18.75 cm, so 5 mm diameter
>makes C==0.084*lambda. According to figure 7-10 [KRAUS], this would be a
>normal-mode helix (like the rubber duckie) as opposed to an axial-mode helix
>(like a satellite antenna).

Yes, that's exactly what it is. It's a rubber duckie shrunk to the
appropriate dimensions for 1.6 GHz. It doesn't have to be terribly
efficient, since the preamp in the antenna provides a fair amount of
gain. And it doesn't have to be circularly polarized either, since
the patch antenna inside the GPS will receive linearly polarized
radiation just fine. (And, as you point out, they are in each other's
very near field).

The question is: how can I duplicate it without test equipment?

>I'm also curious whether you need to orient the two antennas to prevent
>oscillation?

I expect so. It's primarily intended for applications where the two
antennas are not near each other - one is on the roof of a car while
the other is inside the car, or one is on the roof of a house while
the other is indoors, etc.

        Dave

33. Re^2: a different sort of antenna

From: W4OQM@aol.com
Date: Wed, 9 Dec 1998 06:42:53 EST
To: tacgps@tapr.org
Message-ID: <98774498.366e623d@aol.com>
Rendered body type: text/plain

Dave,

A couple more comments:

1. If you're sticking this radiating structure right to the top of the GPS
unit, then I don't think it's productive to view this thing as an antenna.
It's more of "one half of a coupling device". The feed-point impedance and
the fields are remarkably difficult to predict in this situation. Remember,
two loop antennas in close enough proximity, become a single device that is
called a transformer.

2. The 26 dB gain referred to in your web-article is quite a bit to deal with.
Cable loss and mismatch help, of course; but, without test equipment, I would
think it difficult to determine if the active antenna system was oscillating.
If it was oscillating, I would suspect that the system performance would go to
pot. It may be that the differences in performance of the different

configurations you tried were merely a matter of finding an orientation that
didn't oscillate. This may account for the "certain amount of fiddling" that
you experienced.

Still an interesting problem.

73,
Charlie W4OQM
c.wells@ieee.org

34. RTCM SC-104 infos anyone???

From: <ve2mrx@amsat.org>
Date: Sun, 13 Dec 1998 01:56:09 -0500
To: <tacgps@tapr.org>
Message-ID: <000001be2665$b23199a0$84132fd1@ve2mrx>
Rendered body type: text/plain

Hi all!

        Just a quickie: Anyone has infos on the format of a RTCM SC-104 message 1
and 9???

        I have an Motorola Oncore VP and would like use it to send DGPS corrections
on APRS. I know of the DGPSIB but it is out of my price range, at least for
now. I already have a 6809 microcontroller board I can use for this. I do
have the Oncore VP binary command reference guide.

                Thanks any and everyone,
                        Martin VE2MRX

[E_O_MSG]

mailto:ve2mrx@amsat.org
---

35. Helical Antennae

From: Darryl Smith <vk2tds@ozemail.com.au>
Date: Thu, 17 Dec 1998 20:19:56 +1100
To: tacgps@tapr.org
Message-ID: <3678CCBB.C3F125B3@ozemail.com.au>
Rendered body type: text/plain

This may sound like a stupid question, but...

        Why isn't there a 140 Ohm resistor between the front unterminated end of the
helical antena and ground?

The reason for the question is that I dug out the only text book I have on the subject
of these antennas, and they described how the thing works. They state that it is
effectively a long wire antenna, but just twisted in a circle. I can see their point.

In the long wire antenna of many wavelengths a resistor is used between the open end
and ground to create a ballenced waveguide and reduce reflections.

On a related matter, why don't antennas have an impedance of 377 ohms to balance that
of free space?

Darryl VK2TDS,
Sydney, Australia

36. Re: [TACGPS:1961] Helical Antennae

From: W4OQM@aol.com
Date: Fri, 18 Dec 1998 13:15:16 EST
To: tacgps@tapr.org
Message-ID: <b13e253c.367a9bb4@aol.com>
Rendered body type: text/plain

In a message dated 12/18/98 5:45:45 AM, you wrote:

>This may sound like a stupid question, but...
>
>   Why isn't there a 140 Ohm resistor between the front unterminated end
of
>the
>helical antena and ground?
>
>The reason for the question is that I dug out the only text book I have on

the
>subject
>of these antennas, and they described how the thing works. They state that it
is
>effectively a long wire antenna, but just twisted in a circle. I can see
their
>point.
>
>In the long wire antenna of many wavelengths a resistor is used between the
open
>end
>and ground to create a ballenced waveguide and reduce reflections.
>
>
>On a related matter, why don't antennas have an impedance of 377 ohms to
balance
>that
>of free space?

Darryl,

There are several types of helical antennas with different radiation patterns. The type of a helix is determined by the circumference (measured in wavelengths) and the pitch angle (measured in degrees). If you unwind one turn of the helix, it forms a right triangle. The pitch angle is one of the angles of this triangle. If you pull the wire straight, the pitch angle is 90 degrees. If you scrunch a single-turn helix down flat (into a ring), the pitch angle is 0 degrees. This is hard to describe in words, but easy to see in a picture. See figure 7-9 on page 243 in Kraus (the reference at the end of this email).

1. Axial mode helix (the Kraus Coil) -- This antenna is circularly polarized and radiates energy off the end. the axial mode helix is the workhorse of satellite communications. An axial mode helix has a circumference of about 0.75 to 1.25 wavelengths and a pitch angle of about 15 degrees.

2. Normal mode helix (the rubber ducky) -- This antenna is linearly polarized and radiates energy just like a dipole does (in a donut normal to the axis of the antenna). If the length of 1 turn of wire of a helical antenna is less than 0.5 wavelengths (for any pitch angle), then the helix radiates in the normal mode.

The normal mode helix has a radiation pattern similar to a straight wire antenna, so I guess this is what your book is talking about. It's sort of like wrapping the wire antenna around a rod to make it smaller. The axial mode helix is an entirely different animal. There are actually other radiation modes of helical antennas, but these are the two most important (see figure 7-10 on page 243 in Kraus).

The terminating resistor in certain HF long-wire antennas (the rhombic and the beverage) is used to absorb the reflected wave. This has the positive effect of modifying the pattern in a desirable way and has the negative effect of wasting transmitter power. If an antenna can be constructed that gives the correct pattern without the terminating resistor, then you have more power to radiate. This technique is rarely used at frequencies above HF. I've never seen it used on a helix antenna. The helix antenna gives an appropriate pattern without it. What the pattern would be with a terminating resistor on an axial mode helix is a very interesting question. I've never seen that analyzed.

The 377 ohms impedance of free space requires some discussion. There is electromagnetic field theory and then there is circuit theory. Circuit theory (that we all learned) is a simplification of field theory that works for distances that are small compared to 1 wavelength. Field theory always works. It's just too complicated to use in most cases. Electromagnetic fields are made up of two components: an electric field and a magnetic field. It turns out that the ratio of the magnitudes of these two field components in free space is always a constant (377) and if you work out the math, the units are ohms. The resistance of a circuit (for a given voltage) is the resistance of that circuit to current. The resistance of freespace (for a given E-field) is the resistance of that space to H-field. These are related, but they are not the same thing (see p. 207 in Kraus).

For the terminally curious: Kraus, J.K., Antennas, 2nd ed., 1988, McGraw-Hill. This is the definitive reference on the subject of helical antennas. John Kraus (W8JK) is the guy who invented the axial mode helix back in the 40s. The 1st edition of his book was written in 1950. Be aware that this is a graduate-level textbook, so it's not an "easy read."

Your questions are good ones. Unfortunately, they touch on subject areas that
aren't easy to explain. I hope this helps.

73,
Charlie -- W4OQM
c.wells@ieee.org

37. RE: [TACGPS:1961] Helical Antennae

From: "Borcher, David (NG-EX)" <DBorcher@GI.com>
Date: Fri, 18 Dec 1998 09:49:55 -0500
To: "'tacgps@tapr.org'" <tacgps@tapr.org>
Message-ID: <0A7F08DCFAFFD1119FE6006097C510D097A838@nogalesxch.nog.gi.com>
Rendered body type: text/plain

(...snip) On a related matter, why don't antennas have an impedance
of 377 ohms to
        balance that of free space?

The best answer I ever got on that question was that in effect the antenna
is a transformer,
transforming the 377 ohm free space impedance to whatever impedance you want
at the
feedpoint.

Dave   K7NG
Tucson AZ

38. Frequency Electronics Standards?

From: John Ackermann <jra@febo.com>
Date: Sat, 19 Dec 1998 09:11:59 -0500
To: tacgps@tapr.org
Message-ID: <199812191412.JAA00167@meow.febo.com>
Rendered body type: text/plain

This is a bit off topic, but I know there are some folks here who are
into frequncy standards.

I have a unique device manufactured by Frequency Electronics. It's a
"Precision Synthesizer" model FE 6018A and incorporates a 5MHz FE-10A
frequency standard that appears to be of pretty good quality. The
whole unit provides outputs at 5kc sine and square wave, 500kc, 505kc,
50mc, 100mc, and 100.005mc in addition to the 5mc output from the
standard. (It's fun to type "mc" instead of "MHz"!)

I've done a web search, and it looks like Frequency Electronics is in
business, but they don't have any web presence and I haven't been able
to find any info about these units on the web.

Anybody know anything about this beast? More specifically, I'd be
interested in knowing specs of the FE-10A standard to see whether it
should be my primary quartz standard (the other option is a very old
Sulzer model 2.5).

John N8UR
jra@febo.com

39. Frequency dividers and distribution

From: John Ackermann <jra@febo.com>
Date: Sat, 19 Dec 1998 11:19:47 -0500
To: tacgps@tapr.org
Message-ID: <199812191619.LAA00392@meow.febo.com>
Rendered body type: text/plain

Another frequency-related post (sorry...)

With the work that's been done on TOC, etc., has anyone thought about
circuits to divide and distribute frequency standard outputs?

For example, the Efratom rubidium standards have a single 10MHz output,
and the Frequency Electronics standard I mentioned in my other post has
a single 5MHz output. It would be nice to generate additional buffered
outputs at the fundamental frequency, and also to create 1MHz and
100kHz signals to drive equipment that requires those.

I presume you could use some class of TTL circuits to do the division
and provide buffering, but what devices would be optimum? And, how
best to handle the sine wave input from the standard to get a low
jitter drive for the devices? Finally, how much filtering would be

necessary to turn the square wave output of the digital circuits into a
clean enough waveform to drive older test equipment that wants to see
something sine-like for its input (I'm thinking maybe two or three
low-pass sections following the digital output)?

Lots of questions, I know... my goal is to come up with a little PC
board that could be configured to take several different input
frequencies and deliver half a dozen or so filtered at various
frequencies depending on the divider setting and the LPF components
used.

Thanks,

John N8UR
jra@febo.com

40. Re: [TACGPS:1965] Frequency dividers and distribution

From: Donald E Haselwood <dhaselwood@ij.net>
Date: Sat, 19 Dec 1998 15:14:27 -0500
To: tacgps@tapr.org
Message-ID: <3.0.6.32.19981219151427.0079eec0@POP3.ij.net>
Rendered body type: text/plain

John,

My thinking has been along the lines of an xtal oscillator and phase-locked
loop, with the Rb providing the reference freq. The xtal osc could be any
freq that is 10 Mhz * N/R (where N and R are integers).   The loop needs a
long time constant so as to remove the (small 128 Hz) fm'ing in the Rb 10
Mhz signal (since the Rb unit fm's the 10 Mhz xtal slightly to implement
the phase-locking to the Rb cell). This one is on my "project list" but
isn't on top at the moment.

73's
Don, W4DH

At 10:20 AM 12/19/98 -0600, you wrote:
>Another frequency-related post (sorry...)
>
>With the work that's been done on TOC, etc., has anyone thought about
>circuits to divide and distribute frequency standard outputs?
>
>For example, the Efratom rubidium standards have a single 10MHz output,
>and the Frequency Electronics standard I mentioned in my other post has
>a single 5MHz output. It would be nice to generate additional buffered
>outputs at the fundamental frequency, and also to create 1MHz and
>100kHz signals to drive equipment that requires those.
>
>I presume you could use some class of TTL circuits to do the division
>and provide buffering, but what devices would be optimum? And, how
>best to handle the sine wave input from the standard to get a low
>jitter drive for the devices? Finally, how much filtering would be
>necessary to turn the square wave output of the digital circuits into a
>clean enough waveform to drive older test equipment that wants to see
>something sine-like for its input (I'm thinking maybe two or three
>low-pass sections following the digital output)?
>
>Lots of questions, I know... my goal is to come up with a little PC
>board that could be configured to take several different input
>frequencies and deliver half a dozen or so filtered at various
>frequencies depending on the divider setting and the LPF components
>used.
>
>Thanks,
>
>John N8UR
>jra@febo.com
>
>
>

41. Re: [TACGPS:1966] Re: Frequency dividers and distribution

From: John Ackermann <jra@febo.com>
Date: Sat, 19 Dec 1998 17:39:13 -0500
To: tacgps@tapr.org
Message-ID: <199812192239.RAA01024@meow.febo.com>
Rendered body type: text/plain

Hi Don --

That's a more elegant solution than I had in mind. What I'm trying to
do (I think...) is emulate with modern devices the multiple dividers
and outputs that some standards offer, or that something like a Fluke
distribution amplifier provides. For example, my old Sulzer 2.5 has
dividers to provide 1 MHz and 100kHz from the 2.5 MHz fundamental.
They're funky analog feedback systems that require pushing a start
button, but they work.

John

> John,
>
> My thinking has been along the lines of an xtal oscillator and phase-locked
> loop, with the Rb providing the reference freq. The xtal osc could be any
> freq that is 10 Mhz * N/R (where N and R are integers).   The loop needs a
> long time constant so as to remove the (small 128 Hz) fm'ing in the Rb 10
> Mhz signal (since the Rb unit fm's the 10 Mhz xtal slightly to implement
> the phase-locking to the Rb cell). This one is on my "project list" but
> isn't on top at the moment.
>
> 73's
> Don, W4DH
>
>
> At 10:20 AM 12/19/98 -0600, you wrote:
> >Another frequency-related post (sorry...)
> >
> >With the work that's been done on TOC, etc., has anyone thought about
> >circuits to divide and distribute frequency standard outputs?
> >
> >For example, the Efratom rubidium standards have a single 10MHz output,
> >and the Frequency Electronics standard I mentioned in my other post has
> >a single 5MHz output. It would be nice to generate additional buffered
> >outputs at the fundamental frequency, and also to create 1MHz and
> >100kHz signals to drive equipment that requires those.
> >
> >I presume you could use some class of TTL circuits to do the division
> >and provide buffering, but what devices would be optimum? And, how
> >best to handle the sine wave input from the standard to get a low
> >jitter drive for the devices? Finally, how much filtering would be
> >necessary to turn the square wave output of the digital circuits into a
> >clean enough waveform to drive older test equipment that wants to see
> >something sine-like for its input (I'm thinking maybe two or three
> >low-pass sections following the digital output)?
> >
> >Lots of questions, I know... my goal is to come up with a little PC
> >board that could be configured to take several different input
> >frequencies and deliver half a dozen or so filtered at various
> >frequencies depending on the divider setting and the LPF components
> >used.
> >
> >Thanks,
> >
> >John N8UR
> >jra@febo.com
> >
> >
> >

42. Re: Helical antenna

From: Darryl Smith <vk2tds@ozemail.com.au>
Date: Sun, 20 Dec 1998 17:18:55 +1100
To: tacgps@tapr.org
Message-ID: <367C96CD.9B69AB67@ozemail.com.au>
Rendered body type: text/plain

Thanks to you both for your comments.

I have ordered a copy of the book by Kraus. I would expect to get that sometime in
the first month or 2 of next year.

Having though about the problem more I supose the resistor is not needed if the
length of the coil is exactly the correct length. What I might do is the following
experiment. Over the period of 2 weeks I will have the helical on the roof. For
the 1st week I will not have the resistor in, and for the 2nd I will have it
there. I will monitor the satelite strengths vs. Al/El and compare them at the end
of the test period. With this data I should be able to plot a radiation pattern

for the antenna in Excel or MatLAB.

I have found that both the Helical and also the capacitor type antennae both work
well for GPS when you add a minicircuits amplifier. I used a MAR-6 and later
realised that this did not have the gain of some of the other IC's.

Also those interested in GPS recievers might want to check out http://www.sigem.ca
. They have SIM module (30 pin!!!) GPS recievers.

Darryl VK2TDS

43. Re: [TACGPS:1965] Frequency dividers and distribution

From: "Robert L. Smith" <bobsmith@mail.i2020.net>
Date: Sun, 20 Dec 1998 09:34:39 -0500
To: tacgps@tapr.org
Message-ID: <19981220144319.AAB14399@OZZIE>
Rendered body type: text/plain

At 10:20 AM 12/19/98 -0600, you wrote:
>Another frequency-related post (sorry...)
>
>With the work that's been done on TOC, etc., has anyone thought about
>circuits to divide and distribute frequency standard outputs?
>
>For example, the Efratom rubidium standards have a single 10MHz output,
>and the Frequency Electronics standard I mentioned in my other post has
>a single 5MHz output. It would be nice to generate additional buffered
>outputs at the fundamental frequency, and also to create 1MHz and
>100kHz signals to drive equipment that requires those.
>
>I presume you could use some class of TTL circuits to do the division
>and provide buffering, but what devices would be optimum? And, how
>best to handle the sine wave input from the standard to get a low
>jitter drive for the devices? Finally, how much filtering would be
>necessary to turn the square wave output of the digital circuits into a
>clean enough waveform to drive older test equipment that wants to see
>something sine-like for its input (I'm thinking maybe two or three
>low-pass sections following the digital output)?

John --

The usual techinque that I have seen for converting square wave to
sine wave involves converting the square wave to a triangle wave
and then do some shaping and filtering on that. There are a number
of IC's about that generate square/triangle/sine wave outputs using
those techniques. Look for "function generator" chips. However most
of those that I recall operate in the audio range. I don't know if
you can find any at 5-10 MHz. You may have to do this with wideband
op-amp integrators, etc.

Distribution with minimum phase jitter/noise requires the use of
mostly linear techinques I think. There are many op-amps around
that are intended for video distribution into low-Z cables. Some
of these with verification testing would probably accomplish your
goal.

        73, Bob Smith, WA4YPV

>
>Lots of questions, I know... my goal is to come up with a little PC
>board that could be configured to take several different input
>frequencies and deliver half a dozen or so filtered at various
>frequencies depending on the divider setting and the LPF components
>used.
>
>Thanks,
>
>John N8UR
>jra@febo.com
>
>
>
---- Avoid computer viruses -- Practice safe hex --------------
 * * Specializing in small, cost effective embedded control systems * *
Robert L. (Bob) Smith   Smith Machine Works, Inc.
internet   bobsmith@i2020.net   9900 Lumlay Road
landline   804/745-1065   Richmond, Virginia 23236+1004

44. Re: [TACGPS:1964] Frequency Electronics Standards?

From: "Robert L. Smith" <bobsmith@mail.i2020.net>
Date: Sun, 20 Dec 1998 09:34:35 -0500
To: tacgps@tapr.org
Message-ID: <19981220144319.AAA14399@OZZIE>
Rendered body type: text/plain

At 08:13 AM 12/19/98 -0600, you wrote:
>This is a bit off topic, but I know there are some folks here who are
>into frequncy standards.
>
>I have a unique device manufactured by Frequency Electronics. It's a
>"Precision Synthesizer" model FE 6018A and incorporates a 5MHz FE-10A
>frequency standard that appears to be of pretty good quality. The
>whole unit provides outputs at 5kc sine and square wave, 500kc, 505kc,
>50mc, 100mc, and 100.005mc in addition to the 5mc output from the
>standard. (It's fun to type "mc" instead of "MHz"!)
>
>I've done a web search, and it looks like Frequency Electronics is in
>business, but they don't have any web presence and I haven't been able
>to find any info about these units on the web.

John --

I did business with Frequency Electronics many years ago (circa 1966) on a
military communications project. At that time the company was founded by and
headed by a Mr. Martin Bloc (dredging up old memories here, spelling
may not be correct). They were located on Long Island and I think
later moved further out onto Long Island. My impression at the time was
that they made very good frequency standards and were sensitive to such
issues as short vs. long term stability and phase noise. I have one of
their 10MHz standards here that was rescued from the trash bin at the end
of the aforementioned project. It is a simple quartz standard, dual
proportional
oven in Dewar flask and has ticked along here quite nicely for many, many
years. I know nothing of the synthesized standard you speak of, they
probably came after my contacts with the company. I was offered a job
with the firm and was VERY tempted to accept, but being an old Illinois
country boy I declined the New York/Long Island life style.

Have you tried EEM, checking the Yellow Pages of the 1986/87 issue
I find --

Frequency Electrns,
55 Charles Lindbergh Blvd.
Mitchel Field, NY 11553
Tel: 516/794-4500,
TWX: 510-223-0418
Empl: 350, Sls Mgr: A. Lazar

The above information is consistent with my recollections.

They list a number of sales offices. In "8 land" I find

Cleveland, OH - Tiby Co. - 216-371-5335

        Good Luck, Bob Smith

>
>Anybody know anything about this beast? More specifically, I'd be
>interested in knowing specs of the FE-10A standard to see whether it
>should be my primary quartz standard (the other option is a very old
>Sulzer model 2.5).
>
>John N8UR
>jra@febo.com
>
---- Avoid computer viruses -- Practice safe hex --------------
 * * Specializing in small, cost effective embedded control systems * *
Robert L. (Bob) Smith   Smith Machine Works, Inc.
internet   bobsmith@i2020.net   9900 Lumlay Road
landline   804/745-1065   Richmond, Virginia 23236+1004

45. Re: [TACGPS:1968] Re: Helical antenna

From: W4OQM@aol.com
Date: Sun, 20 Dec 1998 10:15:56 EST
To: tacgps@tapr.org
Message-ID: <682382d8.367d14ac@aol.com>

Rendered body type: text/plain

Darryl,

My intent in referencing Kraus' book was that you might go find it at your local university library and refer to it. While, IMHO, Kraus is the definitive reference on helical antennas, there are several comments that you or anyone else needs to consider before going out and buying the book.

1. The caveat in my original email stands. This is a graduate-level engineering textbook; and, as such, it is not easy to understand.

2. While most textbooks on antenna theory seem to devote a 10 page section to helical antennas, Kraus devotes a 75-page chapter. The treatment is quite complete. There is even a 12-page section entitled PRACTICAL DESIGN CONSIDERATIONS FOR THE MONIFILIAR AXIAL-MODE HELICAL ANTENNA (sect 7-4). This is quite unusual for a theoretical text.

3. Kraus isn't my first choice for a general textbook on antenna theory. There are other texts that are better organized.

4. For a more practical treatment of all kinds of antennas, a good reference is the Antenna Engineering Handbook, 3rd ed., 1993, McGraw-Hill, edited by Richard C. Johnson (there may be a more recent edition). The 24-page section on helical antennas includes some 60 references. If a ham wants something a bit more theory than the ARRL books and doesn't mind spending $130, this is the one I'd recommend. It's quite full of practical equations, charts, graphs and radiation pattern plots. It's also remarkably broad in its coverage of all facets of antenna design and related subjects. It does not have construction articles. (Note: I am NOT knocking the ARRL antenna books here).

The treatment of antennas that different people find useful varies. At the prices the booksellers get for these books, it's probably best to browse through several before choosing one and buying it.

73,
Charlie -- W4OQM
c.wells@ieee.org

46. Re: [TACGPS:1970] Re: Frequency Electronics Standards?

From: John Ackermann <jra@febo.com>
Date: Sun, 20 Dec 1998 10:27:47 -0500
To: tacgps@tapr.org
Message-ID: <199812201527.KAA15679@meow.febo.com>
Rendered body type: text/plain

Bob, thanks for all the info!

The unit I have is a rack-mounted box with the standard as a separate unit (about 5 inches square) mounted in the front panel. The synthesizer also bolts into the front panel, so they apparently had a pretty modular design. The standard has a 5mc output and the synthesizer generates a set of interesting frequencies (each available on its own front panel BNC). I have no idea what it was used for, but it's an interesting toy!

Actually, I've found the 50 and 100 MHz outputs to be useful for doing quick calibrations of cheap frequency counters.

Anyway, on Monday I'll try to give them a ring and see if any info is available.

I've had all my standards turned off since I moved a couple of years ago, and just this weekend got my WWVB comparator receiver working and the Sulzer 2.5 standard fired up. My real goal is to get the Efratrom Rb that I picked up a few years ago on line; that's mainly a matter of some packaging and getting a divider chain working (per my other post).

Thanks again, and happy holidays!

73,
John

47. Re: [TACGPS:1972] Re: Frequency Electronics Standards?

From: Brooks Shera <ebs@lanl.gov>
Date: Sun, 20 Dec 1998 12:28:12 -0700
To: <tacgps@tapr.org>
Message-ID: <199812201925.MAA23532@lawyer.lanl.gov>
Rendered body type: text/plain

John

You might be interested in the clever 1-chip (PIC) frequency divider by
Tom Van Baak (tvb@veritas.com) that takes a 10 MHz input and produces
9 square wave outputs - one for each frequency decade from 100 kHz to
0.001 Hz (1000 s period).

The source code is on my gps-controlled frequency standard webpage at
www.rt66.com/~shera

And maybe you'll want to lock that Rb to GPS. :-0

73, Brooks

>I've had all my standards turned off since I moved a couple of years
>ago, and just this weekend got my WWVB comparator receiver working and
>the Sulzer 2.5 standard fired up. My real goal is to get the Efratrom
>Rb that I picked up a few years ago on line; that's mainly a matter of
>some packaging and getting a divider chain working (per my other post).

48. Frequency dividers and distribution

From: Brooke Clarke <brooke@pacific.net>
Date: Sun, 20 Dec 1998 11:55:35 -0800
To: tacgps@tapr.org
Message-ID: <367D5636.9D50BB5E@pacific.net>
Rendered body type: text/plain

> Hi:

Brooks Shea has the source code for a PIC 16C84 based divider on his web page.

http://www.rt66.com/~shera/

73,
Brooke
N6GCE

49. Re: [TACGPS:1973] Re: Frequency Electronics Standards?

From: John Ackermann <jra@febo.com>
Date: Sun, 20 Dec 1998 15:42:05 -0500
To: tacgps@tapr.org
Message-ID: <199812202042.PAA16195@meow.febo.com>
Rendered body type: text/plain

> John
>
> You might be interested in the clever 1-chip (PIC) frequency divider by
> Tom Van Baak (tvb@veritas.com) that takes a 10 MHz input and produces
> 9 square wave outputs - one for each frequency decade from 100 kHz to
> 0.001 Hz (1000 s period).
>
> The source code is on my gps-controlled frequency standard webpage at
> www.rt66.com/~shera
>
> And maybe you'll want to lock that Rb to GPS. :-0
>
> 73, Brooks
>

Hi Brooks --

Thanks for the pointer to the PIC design. My ultimate plan is to get
the Rb synced to GPS; that's about step 4 in the process...

73,
John

50. Frequency Electronics Standards?

From: Darryl Smith <vk2tds@ozemail.com.au>
Date: Mon, 21 Dec 1998 08:27:10 +1100
To: tacgps@tapr.org
Message-ID: <367D6BAD.3A35F199@ozemail.com.au>
Rendered body type: text/plain

> I have a unique device manufactured by Frequency Electronics. It's a
> "Precision Synthesizer" model FE 6018A and incorporates a 5MHz FE-10A
> frequency standard that appears to be of pretty good quality. The
> whole unit provides outputs at 5kc sine and square wave, 500kc, 505kc,

> 50mc, 100mc, and 100.005mc in addition to the 5mc output from the
> standard. (It's fun to type "mc" instead of "MHz"!)

I have not come across this unit, but Electronics Australia released a couple of
similar units as kits. They were based on Xtal oscilators in an oven, phase locked to
the 15625 Hz of the some of the local TV stations. And the reports were that the unit
could stay within 10 parts of the standard used by the TV station. It had similar
outputs. It would be interersting to combine this with the TAC and a GPS.

Darryl VK2TDS

51. Re: Frequency dividers and distribution

From: "John K. Pringle" <jpringle@tampabay.rr.com>
Date: Sun, 20 Dec 1998 17:08:34 -0500
To: "TAC-2 mail list" <tacgps@tapr.org>
Message-ID: <000901be2c65$490a8da0$a31f5c18@john.tampabay.rr.com>
Rendered body type: text/plain

A couple of months ago Tom Clark published a neat little circuit for
producing multiple output frequencies from a standard phase-locked to GPS.
In one of his posts, Tom asked if there was enough interest in such a device
to pursue further development/distribution. I replied in the affirmative but
saw no other posts showing much interest and heard no more from Tom on the
subject so apparently it was dropped. Maybe now is the time to revive some
interest.

73 John W4SF

52. Re: [TACGPS:1976] Frequency Electronics Standards?

From: John Ackermann <jra@febo.com>
Date: Sun, 20 Dec 1998 19:23:34 -0500
To: tacgps@tapr.org
Message-ID: <199812210023.TAA16777@meow.febo.com>
Rendered body type: text/plain

>
>
> > I have a unique device manufactured by Frequency Electronics. It's a
> > "Precision Synthesizer" model FE 6018A and incorporates a 5MHz FE-10A
> > frequency standard that appears to be of pretty good quality. The
> > whole unit provides outputs at 5kc sine and square wave, 500kc, 505kc,
> > 50mc, 100mc, and 100.005mc in addition to the 5mc output from the
> > standard. (It's fun to type "mc" instead of "MHz"!)
>
> I have not come across this unit, but Electronics Australia released a couple of
> similar units as kits. They were based on Xtal oscilators in an oven, phase locked to
> the 15625 Hz of the some of the local TV stations. And the reports were that the unit
> could stay within 10 parts of the standard used by the TV station. It had similar
> outputs. It would be interersting to combine this with the TAC and a GPS.
>
> Darryl VK2TDS

Hi Darryl --

You used to be able to do something similar in the US, when the network
colorburst signal came from highly stable oscillators. But these days
the digital stuff they do destroys the traceability.

This thing appears to be a pre-IC set of dividers and PLLs to generate
several discrete freqencies from one highly stable source. Since I've
learned that this company does a lot of space-related stuff, I suspect
this may have been used for some sort of telemetry system.

John

53. TAPR FTP Site

From: "Greg Jones, WD5IVD" <wd5ivd@tapr.org>
Date: Tue, 29 Dec 1998 00:57:57 -0600
To: "HF SIG list   mailing"<hfsig@tapr.org>, " Spread Spectrum "<ss@tapr.org>,
        " TAPR/AMSAT DSP "<dsp@tapr.org>,
        "APRS SIG list   mailing"<aprssig@tapr.org>,
        "NETSIG list   mailing"<netsig@tapr.org>,
        "BBS SIG list   mailing"<bbssig@tapr.org>,
        " tacgps "<tacgps@tapr.org>, aprsnews, mic-e,
        TAPR Regional Freq <regional_freq@tapr.org>
Cc: "Bill Westradio   Pasternak"<billwa6itf@aol.com>,
        "Len KB7LPW   Winkler"<lenwink@indirect.com>,
        "Hap KC9RP RAIN Holly"<hholly@ais.net>,

"Greg Jones WD5IVD" <wd5ivd@tapr.org>, "Rich CQ VHF"<CQVHF@aol.com>,
"Gagne, Jennifer, N1TDY" <jgagne@arrl.org>,
"Donald Rotolo"<73227.2644@compuserve.com>,
"Stan Horzepa"<stanzepa@nai.net>,
" Bob Hansen (TAPR) "<psr@tapr.org>,
"Ham Radio On-line" <vbook@vbook.com>,
" Tom McDermott "<mcdermot@eagle.aud.alcatel.com>,
<rlindquist@arrl.org>, "Brad Smith, KC5SP" <brads@galstar.com>
Message-ID: <v04020a20b2ae2874411e@[207.43.172.66]>
Rendered body type: text/plain

Please be aware that the TAPR FTP site (ftp://ftp.tapr.org) has undergone a major reorganization as part of the upcoming web site restructuring and redesign.

If you have links on web pages that reference into our ftp site, please take a moment to check them and update those URLs to reflect the changes at our site.

The shallower directory structure should make things easier for individuals visiting our site to find files and information.

Sorry for any inconvenience this might cause.

Cheers - Greg Jones, WD5IVD
TAPR

The new FTP directory structure:

ftp://ftp.tapr.org
Top Level:

```
        aprssig/
                WinMacData/
                aprsnews/
                dosstuff/
                        APRSdos/
                        DOSmisc/
                garmin/
                history/
                javastuff/
                linux/
                macstuff/
                        MacAPRS/
                        MacGPS/
                        MacMisc/
                        PacketTracker/
                mail_archive/
                maps/
                        100K_Not_On_CD/
                        MacMaps/
                        PCMaps/
                        WinMacMaps/
                mic-e/
                movies/
                palmstuff/
                        palmaprs/
                        palmmaps/
                        palmmisc/
                        palmos/
                presentations/
                shlib/
                upload/
                winstuff/
                        APRSPLUS/
                        Waypoint/
                        WinAPRS/
                        WinMisc/

        bbssig/
                mail_archive/

        das/
                mail_archive/

        dcc/

        dsp/
                dsp56000/
```

```
        dsp56001/
        dsp56002/
        mail_archive/
        psa_sound_card/
        recent_uploads/
        tms320c10/
        tms320c26/
        tms320c50/
        upload/

dsp93/
        Paccomm_eproms/
        diskettes/
        dsp93_eproms/
        mail_archive/
        manuals/
        schems/
        simulators/
        software/
        software.list
        source/
        stlouis.wrkshp.95/
        updates/
        upload/
        util/

general/
        9600baud/
                ALINCO/
                ICOM/
                KENWOOD/
                MOTOROLA/
                YEASU/

gps/
        HPAN52-2/
        garmin/
        motorola/

hfsig/
        mail_archive/

info/
        kits/
        logos/
        publications/

netsig/
        mail_archive/

psr/

pub/

regional_freq/
        mail_archive/

software_lib/
        DEMOS/
        Linux/
        RF/
        UPLOAD/
        an93/
        bbs/
        dsp/
        gps/
        listing
        misc/
        sat/
        switch/
        tcpip/
        terminal/
        thenet.txt
        tnc/
        utils/
        weather/

ss/
        mail_archive/
```

```
                SS_STA/
                dcc97_ss_seminar/

        tac2/
                mail_archive/

        talnet/

        tapr-bb/
                mail_archive/

        tapr-tnc/
                mail_archive/

        utils/

-----
Greg Jones, WD5IVD                  Austin, Texas
wd5ivd@tapr.org      http://www.tapr.org/~wd5ivd
```

54. New SIG for the Kenwood THD7A/E

```
From: "Horzepa, Stan" <Stan_Horzepa@adc.com>
Date: Wed, 30 Dec 1998 12:57:46 -0600
To: AO16APRS <ao16aprs@tapr.org>, APRS-FL <aprs-fl@tapr.org>,
        APRSNEWS
 <aprsnews@tapr.org>, APRSSIG <aprssig@tapr.org>,
        BBSSIG
 <bbssig@tapr.org>, DSP sig <dsp@tapr.org>,
        HFSIG <hfsig@tapr.org>, HTAPRS <htaprs@tapr.org>,
        MIC-E sig <mic-e@tapr.org>, NETSIG
 <netsig@tapr.org>,
        PROPNET sig <propnet@tapr.org>,
        REGIONAL_FREQ sig
 <regional_freq@tapr.org>, SS sig <ss@tapr.org>,
        TACGPS sig
 <tacgps@tapr.org>, TAPR-BB sig <tapr-bb@tapr.org>,
        TAPR-TNC
 <tapr-tnc@tapr.org>
Message-ID: <1B66FFC6BE1CD211A0620008C7A42AC21EF760@MRDNEXCH01.ct.adc.com>
Rendered body type: text/plain
```

TAPR is pleased to announce the formation of a new special
interest group, the HTAPRS SIG.

The purpose of HTAPRS is to provide a forum for the discussion
of issues related to the Kenwood THD7A/E transceiver. (HTAPRS
is also intended to lessen the number of messages on TAPR's
APRSSIG by moving THD7A/E traffic off that SIG.)

To subscribe to the HTAPRS mail list, send email to
listserv@tapr.org with the following text in the body of the
message:

   subscribe htaprs your_first_name your_last_name